Neighbourhood Pharmacy Association of Canada

Association canadienne des pharmacies de quartier

Cost Comparison of Vaccine Distribution Options in British Columbia

August 21, 2020

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Executive Summary

The current distribution of influenza vaccines to pharmacies and physicians requires significant human resources from public health each October and November. While this model has worked in the past, inefficiencies, wastage, and the new challenges of COVID-19 present an opportunity to shift the existing model for vaccine distribution from public health to one using the pharmaceutical distribution system.

In most parts of the province, the sophisticated supply chain of pharmaceutical distributors serves pharmacies in B.C. with daily, next-day shipment of drug orders. This allows B.C. pharmacies to efficiently manage their extensive drug inventory, because they can rapidly replenish their stock. This rapid, responsive, and efficient supply chain serves B.C. pharmacies and patients well. Efficiencies have been documented in Canadian jurisdictions where the pharmaceutical supply chain manages influenza vaccination delivery.

This report will examine the current distribution system for influenza vaccines in British Columbia and demonstrate the opportunity for cost savings if the existing system shifts to the pharmaceutical distribution network.

By switching to the pharmaceutical distribution system, B.C. will experience several benefits:

- Fewer patients turned away because of insufficient supply.
- More effective use of public health personnel during the pandemic.
- Estimated savings of $450,000 due to reduced wastage.
- Maximum use of influenza vaccine inventory when demand is expected to be unusually high.

In light of these findings, and understanding the significant burden that COVID-19 is placing on public health systems, we recommend the following:

1. Immediately move to the pharmaceutical distribution system for influenza vaccines in all regions, starting with the 2020/21 flu season.
2. Begin with pharmacies in the 2020/21 flu season and add physician distribution for the 2021/22 flu season.
3. Convene a Working Group of key stakeholders to plan and oversee the transition and task the Working Group with a final report to be delivered in May 2021.

Introduction

The objective of this report is to assess the cost impacts of using the existing pharmaceutical distribution network to distribute influenza vaccines in B.C. It is especially important to consider this for the 2020/21 flu season, given the uncertainties of a second wave of COVID-19, the anticipated high demand for influenza immunizations, and the fact that pharmacy provides more than half of all the influenza vaccinations in B.C. A supply chain that is rapid, responsive and efficient will be critical this Fall.

Approximately 1.53 million influenza immunizations are anticipated for the 2020/21 flu season in B.C. More than half of these will be provided by a pharmacist in a community pharmacy. British Columbians are served by approximately 1,350 community pharmacies, which are found in every community across the province. Most of these pharmacies provide immunization services, including seasonal influenza. While the flu season runs from October to February, 80 per cent of vaccinations are provided in October and November.

The distribution of vaccines in B.C. has not changed significantly in decades. While it has served British Columbia well in the past, it demonstrates inefficiencies when compared with modern distribution practices and supply chains. Inefficient distribution of vaccines is wasteful and expensive, both in terms of unused doses of vaccine and the use of scarce public health human resources.

In contrast, pharmacies in B.C. are served by a sophisticated supply chain of pharmaceutical distributors. In most parts of the province, pharmacies receive daily, next-day shipment of drug orders. This allows them to manage an expensive drug inventory most efficiently, because they can rapidly replenish their stock.

At a time when all public health personnel are stretched to capacity, it is prudent for them to stay focused on managing the COVID-19 pandemic, rather than the administration and distribution of influenza vaccine, especially when an efficient and sophisticated option already exists.

Faced with the prospect of a high demand for influenza immunization, a second wave of COVID-19, and the re-opening of schools and the economy, B.C. needs modern, secure, and cost-effective vaccine distribution to ensure the best possible outcomes for its citizens.

Implications of Vaccine Distribution During a Pandemic Response

B.C. has been recognized across Canada for their effective response to the COVID-19 pandemic. However, many experts anticipate a resurgence of the virus in the Fall at the same time that seasonal influenza arrives.

The current vaccine distribution system requires public health workers to devote time and energy to the distribution of influenza vaccine at the very time they will be needed to respond to a second wave of COVID-19. By shifting to the pharmaceutical distribution system, public health workers are freed up to focus on the COVID-19 response.

CASE STUDY: AUSTRALIA

Based on the experience of healthcare providers in Australia this spring, we can expect an increased demand for influenza vaccine during the 2020/21 flu season.

Pharmacies in Australia found that the demand for influenza immunizations was approximately 30 per cent higher than in previous seasons and that the demand came earlier in the season than typical.

Use of the pharmaceutical distribution system will also prepare B.C. for the eventual distribution of a COVID-19 vaccine. It seems likely that the initial supplies of a COVID-19 vaccine will be scarce and will require an efficient distribution system plus clear guidelines for administration to the most critical patients. Data collected by pharmacies and the pharmaceutical distributors will be invaluable in allocating scarce vaccine to the communities most in need. It will be more important than ever to ensure that wastage is reduced to a minimum and that every dose of vaccine purchased is administered.

Use of the pharmaceutical distribution system has been shown to:

- increase the number of pharmacies participating in flu shot programs;
- reduce wastage; and,
- has procedures and expertise in the management of drugs which are in scarce supply.

B.C. is fortunate to have the majority of pharmacies participate in the seasonal administration of influenza vaccine. However, pharmacists are concerned for their safety and the safety of their staff this season. Pharmacies would very much like to use the efficient and convenient pharmaceutical distributors that serve them every day. The convenience will encourage pharmacies to stay within the program and thus provide greater access for British Columbians.

Previous Research

In British Columbia and across the country, public health agencies and pharmacies have worked together to examine the extent to which efficiencies can be achieved by using the pharmacy supply chain. In British Columbia, Shoppers Drug Mart (SDM) and McKesson have both conducted successful pilot projects with health authorities that correlated to increased availability, lower wastage, and higher vaccination rates. Elsewhere in Canada, the Canadian Association for Pharmacy Distribution Management (CAPDM) has noted significant reductions in wastage in the first two years that provincial influenza vaccine distribution is managed through the pharmaceutical supply chain.

Shoppers Drug Mart and Interior Health

Shoppers Drug Mart has piloted influenza vaccine distribution through their Western Distribution Centre with the Interior Health Authority for two seasons starting in 2016/17. They reported significant decreases in wastage, plus other benefits:

- Wastage declined to an insignificant level
- Pharmacies were more consistently in-stock throughout the flu season.
- Fewer patients were turned away due to insufficient inventory of vaccine.
- Increased vaccination rate assumed since a higher percentage of doses were administered and fewer patients were turned away.
- Interior Health had fewer orders to manage.
    - Less work to transcribe faxes, pick orders, record transactions, etc.
- More efficient utilization of pharmacists, allowing high skilled healthcare providers to focus on patient care rather than picking up stock.
- Easier end of season reporting as results are consolidated by the distributor.
- No cold chain breaks were found.

McKesson and Island Health

McKesson did a pilot study in 2013 with Island Health Authority and 76 retail pharmacies. The results were very favourable:

- No wastage was experienced due to cold chain breaks or distribution waste.
- Participating pharmacies did not turn away any patients due to lack of vaccine supply and because they received next day delivery, they reduced the amount of stock on hand.
- The influenza program was thus more responsive and efficient, since inventory was available to meet local changes in demand.
- The BC Centre for Disease Control (BCCDC) was reported to be very pleased with the visibility of inventory and ordering controls.

Observations in Other Canadian Provinces

The Canadian Association for Pharmacy Distribution Management (CAPDM) has followed the use of pharmaceutical distribution systems in Alberta, Saskatchewan, Ontario and Prince Edward Island. They note that reductions in wastage of 5 percentage points are to be expected within the first two years of switching influenza vaccines to the pharmaceutical distribution system.

They also noted that influenza vaccines generally account for approximately half of all vaccines distributed through public health annually, however, almost all the influenza vaccines are distributed over a 5-week period at the beginning of the flu season. Public health offices therefore must have infrastructure – refrigerators, warehouse space, etc. – to accommodate this surge in capacity in October and November. The rest of the year, this infrastructure is not required. Pharmaceutical distributors are sized to more easily accommodate the influenza vaccine surge. The increased infrastructure demands on public health do not immediately translate into cost savings when switching to the pharmaceutical distribution system, but over time they will make a difference.

Current Distribution for Influenza Vaccine

The current vaccine program requires the interaction of a number of organizations:

The Provincial Health Services Authority (PHSA) works with the five regional health authorities to plan and co-ordinate the delivery of provincial programs and specialized services.

The BC Centre for Disease Control (BCCDC), which is a program of the PHSA, provides analytical and policy support to the B.C. government and health authorities on matters related to public health including vaccines and immunizations. BCCDC is responsible for acquiring vaccines for the entire province. They forecast the demand, manage the tenders, evaluate bids and determine how much of each vaccine will be purchased. Manufacturers deliver to BCCDC at the beginning of October, and BCCDC then distributes it to approximately 100 hospitals and public health units across the province.

ImmunizeBC is managed by the BCCDC and provides information and connects interested patients with local public health clinics. Those public health clinics are managed and funded by health authorities but get direction from the PHSA and BCCDC to ensure consistency of policies and services.

BC PharmaCare, a program of the Ministry of Health, is responsible for paying fees to pharmacies to administer vaccinations.

Manufacturers deliver vaccinations to the BCCDC at the beginning of October each year, for distribution throughout the province to pharmacies, physicians, hospitals, and local public health units.

Local public health units receive faxed orders for vaccines from physicians and pharmacies in their area and notifies them when the orders will be ready for pick-up. Pharmacists from each pharmacy drive to the public health unit, bringing with them a cooler for transporting the vaccine back to their pharmacy. Public health unit staff retrieve the order and bring it out to the pharmacist who packs it into a cooler. The pharmacist returns to the pharmacy and transfers the vaccine to a refrigerator at the pharmacy. Pharmacists will make a trip to the public health unit every 2-3 weeks during flu season, depending on the availability of vaccine.

In addition to their influenza vaccination-related responsibilities, each of the aforementioned entities has significant responsibilities to the population of British Columbia.

With the possibility of a second wave of COVID-19 occurring this Fall, a potential COVID-19 vaccination to be distributed to the public, and other day-to-day priorities, the pharmacy supply chain offers the opportunity for these entities to focus on core services by shifting one seasonal burden to a trusted partner.

Additional benefits include finding efficiencies in distribution and increasing the vaccination rate. This will be crucial should British Columbia be faced with a second wave of the COVID-19 pandemic coinciding with influenza season 2020/21.

Cost Comparisons

Comparing costs between the current system of distribution for seasonal influenza vaccination and a proposed model that uses the pharmacy distribution system finds an opportunity for additional value of $504,000 per year. If fewer doses of influenza vaccination are procured – to account for the reduction in wastage that could be achieved by capitalizing on the efficiencies of the pharmacy system – an additional $450,000 in savings can be found.

Building on the assumptions detailed in Annex I, this analysis calculates the Cost per Administered Dose for the current vaccine distribution system and the proposed pharmaceutical distribution system. Cost per Administered Dose is a better comparator than Total Cost as it reflects the value and efficiency of the immunization program. This is not a clinical analysis of the value of influenza vaccines; that work has been done by numerous academics and clinicians over the years. Our starting assumption is that the government of B.C. is already satisfied with the clinical benefits – reduced mortality, reduced hospitalizations, reduced pain and suffering, and greater workforce productivity – that is provided by an effective influenza immunization program.

Current System

The two tables below show the cost of the current distribution system given the assumptions described in Annex I. The cost per dose of returning unused doses, i.e. wastage, is assumed to be the same as the cost going in the other direction.

Current System	Doses Purchased	Wasted Doses	Administered Doses
All B.C.	1,526,000	152,700	1,374,300
Pharmacy provided	916,000	91,600	824,400
Public Health provided	305,000	30,500	274,500
Physician provided	214,000	21,400	192,600
Other Community	92,000	9,200	82,800

Current System	Cost of Vaccine	Cost of Distribution	Cost of Returning Waste Doses	Total Cost	Cost per Administered Dose
All B.C.	$21.38	$0.08	$0.01	$21.46	$15.62
Pharmacy provided	$12.82	$0.05	$0.00	$12.87	$15.62
Public Health provided	$4.27	$0.02	$0.00	$4.29	$15.62
Physician provided	$3.00	$0.01	$0.00	$3.01	$15.62
Other Community	$1.29	$0.00	$0.00	$1.29	$15.62
Costs in millions of $, unless otherwise noted.					

In this model the overall cost of the B.C. influenza program is estimated as $21.46 million and the cost per administered dose is $15.62.

Proposed System

Under the proposed model the cost per administered dose is $15.29, which is $0.33 less than the current model. For 1.53 million doses this represents a $504,000 increase in value.

The proposed model assumes that pharmacy is supplied through the pharmaceutical distribution system and that physicians are supplied through another centralized distribution system. The Canadian Pharmaceutical Distribution Network (CPDN) has been proposed as a distributor for physician's offices and clinics. Again, the cost of the reverse logistics, i.e. returns, is the same as the distribution cost in the forward direction.

The model also assumes that the doses provided by public health will move towards pharmacy and thus the pharmaceutical distribution system. Interior Health Authority has announced that it will no longer be providing mass public health clinics for influenza and will encourage the use of pharmacy or physicians as an alternative. The Other Community segment is mostly made up of long-term care residences which are all served by pharmacy and we assume that the distribution of influenza vaccine will likewise migrate to the pharmacy distribution system. For this reason, we assume that all the doses in the proposed solution will go through the pharmaceutical distribution system.

Proposed System	Doses Purchased	Wasted Doses	Administered Doses
All B.C.	1,527,000	76,350	1,450,650
Pharmacy provided	916,000	45,800	870,200
Public Health provided	305,000	15,250	289,750
Physician provided	214,000	10,700	203,300
Other Community	92,000	4,600	87,400

Proposed System	Cost of Vaccine	Cost of Distribution	Cost of Returning Waste Doses	Total Cost	Cost per Administered Dose
All B.C.	$21.38	$0.76	$0.04	$25.90	$15.29
Pharmacy provided	$12.82	$0.46	$0.02	$13.30	$15.29
Public Health provided	$4.27	$0.15	$0.01	$4.43	$15.29
Physician provided	$3.00	$0.11	$0.01	$3.11	$15.29
Other Community	$1.29	$0.05	$0.00	$1.34	$15.29
Costs in millions of $, unless otherwise noted.					

The table below shows the decreases in cost per administered dose for a variety of scenarios. Even modest improvements in wastage lead to cost savings per dose.

Cost per Administered Dose assuming 1.53 million doses					
	Current Wastage	**Cost per Administered Dose**	**Proposed Wastage**	**Cost per Administered Dose**	**Cost Savings per Dose**
Proposal	10.0%	$15.62	5.0%	$15.29	-$0.33
Typical two-year change	12.0%	$15.97	4.0%	$15.13	-$0.84
Breakeven	10.0%	$15.62	6.9%	$15.62	$0.00

Additional Opportunities for Cost Savings

Another way to think about these results is to take advantage of the lower vaccine wastage by ordering fewer doses. Under the current system, approximately 1.53 million doses must be purchased in order to ensure that 1.37 million doses are administered. By using the pharmaceutical distribution system wastage is decreased and only 1.45 million doses must be purchased to ensure that 1.37 million doses are administered. Approximately 80,000 fewer doses are required to achieve the same result. This translates into savings of $450,000 over the current system.

Proposed System	**Doses Purchased**	**Wasted Doses**	**Administered Doses**	**Purchases vs. Current**
All B.C.	1,446,632	72,332	1,374,300	-80,368
Pharmacy provided	867,789	43,389	824,400	-48,211
Public Health provided	288,947	14,447	274,500	-16,053
Physician provided	202,737	10,137	192,600	11,263
Other Community	87,158	4,358	82,800	4,842

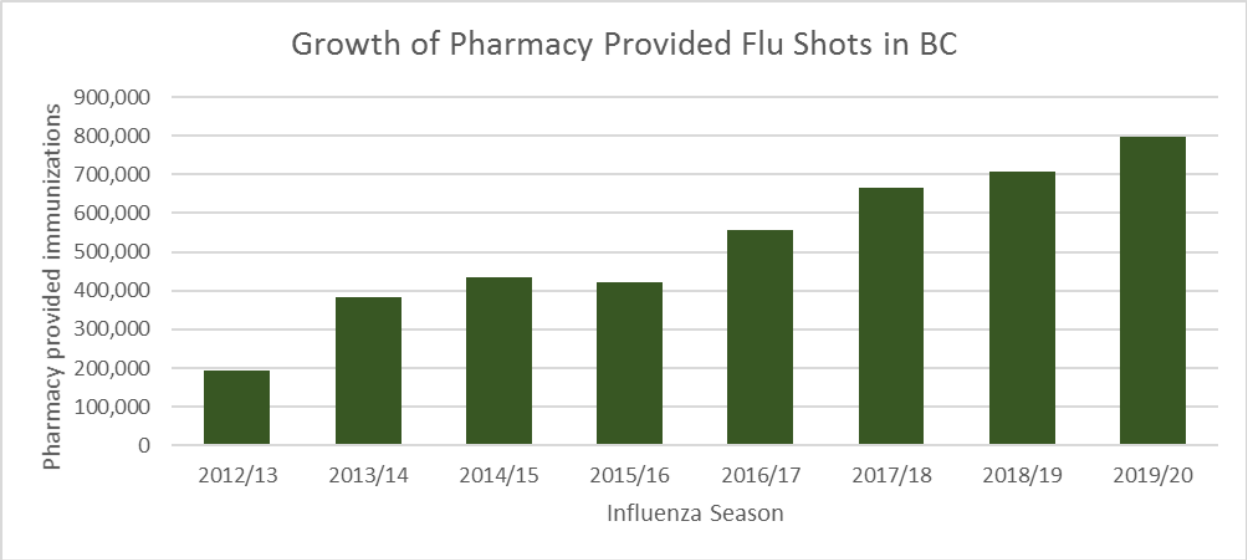
Proposed System	**Cost of Vaccine**	**Cost of Distribution**	**Cost of Returning Waste Doses**	**Total Cost**	**Cost per Administered Dose**	**Savings vs. Current Program**
All B.C.	$20.25	$0.72	$0.04	$24.50	$15.29	$0.45
Pharmacy provided	$12.15	$0.43	$0.02	$12.60	$15.29	$0.27
Public Health provided	$4.05	$0.14	$0.01	$4.20	$15.29	$0.09
Physician provided	$2.84	$0.10	$0.01	$2.94	$15.29	$0.06
Other Community	$1.22	$0.04	$0.00	$1.27	$15.29	$0.03
Costs in millions of $, unless otherwise noted.						

Other Benefits of Using the Pharmaceutical Supply Chain

Other jurisdictions have reported that use of the pharmaceutical distribution system has resulted in easier tracking and reporting of vaccine distribution. Rather than having every local public health unit produce end of season reports on vaccine usage and wastage, a handful of pharmaceutical distributors produce detailed end of season reports. Aggregation and interpretation of the results by BCCDC is therefore greatly simplified.

Previous studies have also shown that fewer patients are turned away due to insufficient inventory of vaccine at the pharmacy. This should result in improved vaccination coverage as patients receive the vaccine when and where they desire.

Note also that the number of influenza immunizations provided by pharmacy continues to grow in B.C. British Columbians have shown a preference for receiving their influenza vaccine in the pharmacy because of the convenience and easy accessibility. As more and more vaccinations are provided by pharmacy, the potential for savings from using the pharmaceutical distribution system becomes more significant.



Conclusion

Finding efficiencies in the existing influenza vaccination distribution system that save money and increase vaccination rates will be crucial as British Columbia braces for a potential second wave of COVID-19 during flu season, remains focused on minimizing the unintended consequences of pandemic mitigation measures, and provides services and support to residents to ensure they are able to do their part to flatten the curve.

As the Government of British Columbia looks for opportunities to strengthen its healthcare system in preparation for a potential second wave, pharmacies and pharmacists can continue to play a significant role as members of British Columbians' local health team and as a trusted partner to the province.

Shifting the burden of distributing seasonal influenza vaccines from the public health system to the established, trusted pharmacy system unlocks the potential for greater efficiencies. Public health resources can be re-allocated to focus on COVID-19, public money can be saved by reducing vaccine wastage, and the public itself will benefit by having greater access to the seasonal influenza vaccine.

Given these efficiencies, we are pleased to make the following recommendations:

1. Immediately move to the pharmaceutical distribution system for influenza vaccines in all regions, starting with the 2020/21 flu season.
2. Begin with pharmacies in the 2020/21 flu season and add physician distribution for the 2021/22 flu season.
3. Convene a Working Group of key stakeholders to plan and oversee the transition. Task the Working Group with a final report to be delivered May 2021.

Annex I: Costing Model Assumptions

Several assumptions have been made about the current vaccine program in B.C. The average cost per dose of the vaccines is assumed to be $14.00. The actual amount is not public information and depends on contracts with manufacturers and the type of vaccine administered.

CAPDM estimates that the cost to distribute influenza vaccine is $0.50 per dose. This cost includes cold storage of the vaccine, as well as daily distribution to pharmacies in temperature-controlled packs that maintain complete cold chain throughout the process.

Costs for the B.C. health system to distribute the vaccine to pharmacy are not known. Arguments claiming that the cost is zero, since no reductions in headcount will result from the decision to move to a pharmacy distribution system, negates the opportunity cost of allocating employee time. Currently, employees must spend significant time processing orders, picking, documenting, and reporting. During flu season, the time commitment is not insignificant.

Because pharmacies pick-up the order from public health sites and bring their own coolers, there is no cost to the province for packaging or delivery. We have proposed a very modest cost of $0.05 per dose to reflect the current distribution cost. The actual number will be much higher. It is worth noting that the results are relatively insensitive to changes in this figure.

Variable	Assumption
Average cost of vaccine per dose	$14.00
Current cost to distribute vaccine per dose	$0.05
Proposed cost to distribute vaccine per dose	$0.50
Current wastage of doses	10%
Proposed wastage of doses	5%

The current wastage, doses purchased but not administered, is not known. We have assumed 10 per cent, as this is thought to be consistent with other provinces who were using public health to distribute flu vaccine. The anticipated wastage is assumed to be 5 per cent under the pharmaceutical distribution system, although as the Shoppers Drug Mart pilot showed, wastage far below this amount can be achieved.

Volume estimates are based on the 796,208 doses administered by pharmacy in 2019/20, increased by 15 per cent for this coming season and rounded off to the nearest thousand. It was assumed that pharmacy will provide 60 per cent of the total doses, meaning a total of 1.5 million doses for B.C. in 2020/21. Assumptions for the volumes administered by other providers were based on the experience in the Interior Health Authority. These estimates are also consistent with Alberta, where pharmacists have also had the authority to immunize for many years.

Provider	Percent of Total Doses	Estimated Doses 2020/21
Pharmacy	60%	916,000
Public Health	20%	305,000
Physicians	14%	214,000
Other Community	6%	92,000
Total	100%	1,526,000

Public Health includes mass clinics, which in some regions are being discontinued and participants are encouraged to go to their local pharmacy instead. For this reason, the number for public health is likely overestimated and the number for pharmacy is underestimated. Other Community providers includes long-term care facilities, hospitals, and first nations bands.