

Cost Analysis of Public Health Influenza Vaccine Clinics in Ontario

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ABSTRACT

Objective: Public health in Ontario delivers, promotes and provides each fall the universal influenza immunization program. This paper addresses the question of whether Ontario public health agencies are able to provide the influenza immunization program within the Ministry of Health fiscal funding envelope of \$5 per dose.

Methods: Actual program delivery data from the 2006 influenza season of Wellington-Dufferin-Guelph Public Health (WDGPH) were used to create a model template for influenza clinics capturing all variable costs. Promotional and administrative costs were separated from clinic costs. Maximum staff workloads were estimated. Vaccine clinics were delivered by public health staff in accordance with standard vaccine administration practices.

Results: The most significant economic variables for influenza clinics are labour costs and number of vaccines given per nurse per hour. The cost of facility rental was the only other significant cost driver. The ability of influenza clinics to break even depended on the ability to manage these cost drivers. At WDGPH, weekday flu clinics required the number of vaccines per nurse per hour to exceed 15, and for weekend flu clinics this number was greater than 21. We estimate that 20 vaccines per hour is at the limit of a safe workload over several hours. Managing cost then depends on minimizing hourly labour costs.

Discussion: The results of this analysis suggest that by managing the labour costs along with planning the volume of patients and avoiding expensive facilities, flu clinics can just break even. However, any increased costs, including negotiated wage increases or the move to safety needles, with a fixed revenue of \$5.00 per dose will negate this conclusion.

Key words: Immunization programs/economics; delivery of health care/economics; influenza vaccine/economics; direct service costs

La traduction du résumé se trouve à la fin de l'article.

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Each fall in Ontario, public health delivers, promotes and provides the annual influenza vaccination program to the residents of Ontario. Although public health is the distribution point for all seasonal influenza vaccine within each geographic health unit, the vast majority of vaccine is given through hospitals, long-term care facilities, physicians and employers.

In Wellington-Dufferin-Guelph Public Health (WDGPH), 61,675 doses of influenza vaccine were delivered in 2006, of which 11,592 doses were provided by public health staff. Public health receives \$5.00 per dose for each influenza vaccine delivered.

This funding envelope has generated discussion among public health units regarding the actual cost of influenza vaccine delivery. Although many "actual costs" have been proposed informally, there is an absence of critical economic evaluation in the literature applicable to Ontario flu clinics run by public health. This analysis seeks to answer the question: Can public health agencies provide influenza immunization within the funding envelope of \$5 per dose? The data from 2006 flu clinics were used to create a cost template to analyze future flu vaccine delivery models.

METHODS

Actual flu clinic data were used to reflect real scenarios. All data analyzed came from the records of both the finance department and the vaccine preventable disease program of WDGPH and reflect 2008 cost data. Unit costs of supplies were calculated by dividing the cost per box by the number of units per box. Unit costs for disposal were obtained by dividing container disposal cost by the average number of syringe units that each contained. Facility costs were the total financial payment made to a facility during a flu clinic as paid by the finance department. Labour costs were based on the

salary of either public health nurses (PHNs) or clerical staff, being at step 5 of the recorded WDGPH pay scale. Benefit costs were added to labour costs at a rate of 24%, reflecting current actual cost. Thirty minutes of both set-up time and tear-down time were included in the labour costs, during which no vaccines are given. Saturday clinics have taken into account the time-and-a-half salary that must be paid. The result of these assumptions, in particular the labour costs being at the highest end of the wage spectrum, ensure that the costs of the flu clinics have not been underestimated.

Estimating the number of flu shots that can be given by a nurse on average each hour over the course of a clinic was determined qualitatively by interviewing managers and staff nurses, observing the process at WDGPH and by 20 years of personal experience from the author in drug delivery and injections.

At WDG, the vaccine administration process includes distribution of information and consent forms in line before registration. The 30 minutes of set-up time includes preparation of 10 vaccines with further doses prepared in batches of 10 to minimize time and wastage. Hand hygiene is performed in front of the next recipient while the consent is verified and questions answered.

One variable cost that was not tracked explicitly is staff mileage for flu clinics. Staff often carpool, and current mileage coding does not indicate whether monies paid are for flu shot clinics. This cost

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was added to the cost of each flu shot clinic as a percentage of the cost of labour. Current estimates are that 2% of labour costs would be a sufficient value to cover mileage costs.

Program costs include advertising and promotion, printing and design, postage and telecommunications, and these have been collected separately. These promotion and administrative costs need to be attributable to the entire flu vaccine delivery program but do not affect the cost of a flu vaccine clinic. Hand sanitizer for the program is distributed to staff at the beginning of the vaccination season and used across many different vaccination clinics, including influenza clinics. This cost, of 15 × \$6.25 for a total of \$93.75, is included in program costs. The true costs of running a vaccine clinic are independent of administrative costs, and each clinic is analyzed as a stand-alone cost centre.

RESULTS

Table 1 contains a summary of the cost variables used in generating the costs of the flu shot clinics. The 2008 price of a vaccine delivery is 24 cents, but with the move to “safety needles” in the future it can be anticipated that this cost will increase. Facility costs varied greatly. The per-dose cost varied from \$0.08 to \$1.73 when the cost of the facility rental was divided over the historic number of clients attending the clinic.

Table 2 contains the flu shot clinic data for the 2006 season with all costs reflecting 2008 actual amounts.

A major variable is the number of doses per hour that a nurse is able to deliver. This number is estimated to be between 25 and 30 at peak times, although this is not sustainable over many hours. The more realistic average is 20 injections per nurse consistently over a 4 to 6 hour clinic. During the 2006 season, the number of vaccines given per nurse per clinic hour ranged from 9.65 to almost 29 for a short 2-hour clinic. Weekday influenza clinics required a minimum of 14 to 18 injections per nurse per hour (rounded up to reflect real people) to cover the costs of the clinic, and for Saturday clinics this increased to 21 to 23, excluding the program costs.

Clerical staff registered between a low of 24 clients per hour per clinic to an amazing high of 100 clients per hour. With these wide variations, it is difficult to extrapolate what is “normal”, but 50 per hour certainly did not look unusual among the 25 community flu clinics reviewed.

Program costs have been fixed at \$4,500 for several years at WDGPH.

The addition of any significant facility fees resulted in most clinics not breaking even. Even without the program costs, it is apparent that the flu shot program costs WDGPH money. Total vaccine revenue was \$57,960, and clinic costs were \$62,407.80. When the average number of vaccines given per nurse per hour falls below 15.55, according to this model the average flu shot clinic lost money. All of the Saturday clinics, when nurses are paid time and a half, lost money, even when the shots per nurse per hour exceeded 18. The ability of these clinics to cover their costs would require the average number of shots per nurse per hour to exceed 21.

DISCUSSION

Ontario is the only Canadian province with a universal influenza immunization program (UIIP). Although influenza immunization has increased rapidly in Ontario compared with the other provinces, the majority of healthy adults currently choose not to

Table 1. Summary of Cost Variables Used in Analysis of Flu Clinic Cost

Cost Variable	2008 Cost
Vaccine delivery per unit (3 cc syringe with needle, alcohol swab ×2, Band-Aid)	\$0.24 /unit
Hazardous waste removal per unit	\$0.0448 /unit
Facility cost (actual cost paid)	\$0 to \$320
Facility cost (per vaccine delivered)	\$0.08 to \$1.73/vaccine
Mileage cost estimate per influenza clinic	2% of labour cost
Program costs (promotion, printing, design, postage, telecommunications, hand sanitizer)	\$4,500.00

get a flu shot.¹ In 2005, the overall provincial immunization rate was 38% compared with 24% for all other provinces.¹

The health benefits of routine influenza immunization of healthy adults have been studied for over a decade.²⁻⁴ In 1995, Nichol and colleagues² published the results of a double-blind placebo controlled trial of flu vaccination of healthy working adults in the US during the 1994-1995 flu season. They concluded that vaccination is cost effective from a societal perspective, with savings of \$46.85 per adult vaccinated. Vaccination was also a net cost saving to the health sector of \$5.99 per adult vaccinated. Lee et al. in their study concluded that vaccination of healthy working adults is cost-beneficial in 95% of influenza seasons except for very mild seasons.⁴ As the influenza virus affects 10% to 20% of the US population each year with an average of 2.8 work days lost for each ill individual, there are large indirect societal costs associated with influenza illness.⁵

Following the introduction of UIIP, Ontario has become a natural policy experiment to evaluate the health and economic implications of vaccination. UIIP is associated with fewer emergency room visits, fewer physician visits and fewer inpatient hospital days, resulting in significant health expenditure savings as well as decreased wait times for acute care beds.¹ The economic benefits to vaccinated patients are fewer days lost at work, decreased cost of over-the-counter medication and potentially some herd immunity for individuals not vaccinated.⁵

While the provincial economic advantages of UIIP are becoming clear, the challenge for public health agencies is to provide the vaccine to the general public within the fiscal restraint of \$5 per dose.

The cost of mileage, supplies and disposal are not significant drivers of clinic costs. The identified main costs are facilities and labour.

Facility costs can be minimized by maximizing the use of public health or partner agency space at no cost before incurring any rental costs. All potential facility costs should be analyzed using historical or anticipated volumes to establish the per-dose cost of rental, to determine whether the fee is sustainable.

Use of clerical staff for support during vaccination clinics should be based on optimum workload of specific clerical skills and anticipated volumes, not on number of nurses. Tools such as card reader technology have the potential to decrease registration time, increase clinic efficiency and minimize the labour costs of clerical staff.

The two most significant economic variables are nursing labour costs and number of vaccines given per nurse per hour. If the hourly labour costs remain unchanged, the options for decreasing average costs include boosting revenue by increasing the number of vaccines given per nurse per hour, either by decreasing current staffing levels or increasing attendance at flu shot clinics. The number of vaccines per nurse per hour has a maximum value beyond which further increases are no longer safe or sustainable. Once this number (estimated as 20, averaged over several hours) has been reached,

Table 2. Influenza Clinic Data

Date	Clinic Loc.	Clinic Hours*	No. of Nurses	Total Nurse Costs	No. of Clerks	Total Clerical Costs	No. of Vaccines	Cost of Supplies	Mileage Costs	Disposal Costs	Facility Costs	Total Costs	Total Revenue	Average Cost Per Vaccine	Vaccines Per Clinic Per Hour	No. of Vaccines Needed To Break Even
Nov. 14	A	5	6	1424.25	2	283.50	545	130.80	34.16	24.41	0.00	1897.11	2725.00	3.48	18.2	
Nov. 14	B	6	8	2278.80	3	510.30	1008	241.92	55.78	45.14	186.94	3318.88	5040.00	3.29	21	
Nov. 14	C	5	4	949.50	1	141.75	240	57.60	21.83	10.75	0.00	1181.42	1200.00	4.92	12	
Nov. 15	D	3	4	569.70	1	85.05	204	48.96	13.10	9.14	0.00	725.94	1020.00	3.56	17	
Nov. 16	E	5	6	1424.25	2	283.50	364	87.36	34.16	16.30	0.00	1845.56	1820.00	5.07	12.1	12.3
Nov. 16	F	5	2	2611.13	2	283.50	720	172.80	57.89	32.24	0.00	3157.56	3600.00	4.39	13	
Nov. 16	G	5	4	949.50	1	141.75	243	58.32	21.83	10.88	120.00	1302.28	1215.00	5.36	12.2	13
Nov. 17	H	3	4	569.70	1	85.05	230	55.20	13.10	10.30	0.00	733.34	1150.00	3.19	28.75	
Nov. 18†	F	10.5	11.14‡	5553.15	3	893.03	888	213.12	128.92	39.76	0.00	6827.98	4440.00	7.69	13	20.7
Nov. 18†	F	9	9.66‡	4127.48	3	765.45	466	111.84	97.86	20.87	320.00	5443.49	2330.00	11.68	9.5	19.4
Nov. 20	J	5	8	1899.00	2	283.50	679	162.96	43.65	30.41	50.00	2469.52	3395.00	3.64	21	
Nov. 21	K	4	5	949.50	2	226.80	246	59.04	23.53	11.02	70.00	1339.88	1230.00	5.45	12.3	13.4
Nov. 21	L	4	10	1899.00	3	340.20	411	98.64	44.78	18.40	0.00	2401.03	2055.00	5.84	10.3	12
Nov. 21	M	5	5	1186.88	1	141.75	501	120.24	26.57	22.43	0.00	1497.87	2505.00	2.99	16.7	
Nov. 22	N	4	8	1519.20	2	226.80	463	111.12	34.92	20.73	0.00	1912.77	2315.00	4.13	14.5	
Nov. 23	O	5	4	949.50	1	141.75	208	49.92	21.83	9.31	0.00	1172.31	1040.00	5.64	10.5	11.9
Nov. 23	P	6	10.33‡	2942.50	3	510.30	677	162.48	69.06	30.32	25.00	3739.65	3385.00	5.52	11	12.1
Nov. 23	Q	5	5	1186.88	2	283.50	365	87.60	29.41	16.34	0.00	1603.73	1825.00	4.39	14.6	
Nov. 24	R	5	7	1661.63	2	283.50	402	96.48	38.90	18.00	0.00	2098.51	2010.00	5.22	11.5	12
Nov. 25†	S	10.5	8	3987.90	3	893.03	866	207.84	97.62	38.78	50.00	5275.16	4330.00	6.09	15.5	22.6
Nov. 25†	T	9	9	3845.48	3	765.45	484	116.16	92.22	21.67	0.00	4840.98	2420.00	10.00	9	18.5
Nov. 27	U	6	6	1709.10	1	170.10	390	93.60	37.58	17.46	0.00	2027.85	1950.00	5.20	10.8	11.3
Nov. 28	V	4	5	949.50	2	226.80	195	46.80	23.53	8.73	0.00	1255.36	975.00	6.44	9.75	12.6
Nov. 29	W	5	5	2136.38	3	425.25	388	93.12	51.23	17.37	0.00	2723.35	1940.00	7.02	8.6	12.1
Nov. 29	Q	5	5	1186.88	2	283.50	11,592	98.16	29.41	18.32	0.00	1616.26	2045.00	3.95	16.3	
TOTALS												62,407.80	57,960.00			

* Clinic hours include 30 minutes of set-up time, 30 minutes of take-down time.
 † Saturday clinics: Saturday clinics have had hours grossed-up to reflect time-and-a-half for labour costs.
 ‡ Reflects partial shift coverage of nursing staff.

revenue is maximized. Weekend labour costs were significant contributors to the costs of weekend flu clinics, and so when provided by public health, there is difficulty in breaking even unless volumes exceed safe levels.

Vaccinations can be provided by many different health care providers, including PHNs, registered nurses and registered practical nurses (RPNs). Public health agencies pay their nursing staff according to union-negotiated wages. The majority of nursing staff who work at WDG are PHNs, and most are currently paid at \$47.10/hour (2008) including benefits. Replacing some PHNs with contract RPNs at approximately \$29.00/hour (including pay in lieu of benefits and vacation) could result in significant savings. If half of the nurses providing vaccines at the flu clinics were RPNs, then the savings would have been \$9,413.32 and the flu clinics would have generated \$5,438.31, covering the general program costs. Saturday clinics might just become viable, but the ratio of RPNs engaged on those days would need to exceed 50%.

General program costs, which amounted to \$4,500 at WDGPH, should be managed separately from the cost of flu shot clinics. WDGPH is moving to “brand” the flu clinics and standardize the yearly promotional material, which should decrease design costs and minimize waste.

Not all public health work can be driven by economic factors. At WDGPH, we propose a balanced approach that looks at our population needs. If there is no other solution than to hold small-volume flu vaccine clinics, then despite these costs public health will continue to offer community clinics.

This study was done in an Ontario independent board of health region. All costs collected are regional and may not reflect other geographic areas. Some public health agencies may employ other staff who work exclusively in influenza clinics, and these costs should be captured. Attributing “management cost” to influenza clinics is only appropriate if the manager’s sole purview is influenza, and this is not a clinic cost but, rather, a general program cost.

CONCLUSIONS

From a population health model, the delivery of a free UIIP provides significant economic benefit to the individual vaccinated as well as to the health care system in general from decreased health care utilization.

For public health, the \$5.00 per dose provided to deliver the flu vaccine presents challenges. The results of this analysis suggest that by managing the labour costs, accurately planning the volume of patients and avoiding expensive facilities, flu clinics can just break even. However, any increased costs, including negotiated wages or the move to safety needles, with a fixed revenue of \$5.00 per dose will negate this conclusion.

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RÉSUMÉ

Objectif : Chaque automne, la Santé publique de l'Ontario assure la prestation, la promotion et l'administration d'un programme universel de vaccination contre la grippe. Nous avons cherché à savoir si les organismes de santé publique ontariens parviennent à offrir ce programme sans dépasser l'enveloppe budgétaire accordée par le ministère de la Santé, soit 5 \$ la dose.

Méthode : À l'aide des données réelles de prestation du programme dans la circonscription sanitaire de Wellington-Dufferin-Guelph (CSWDG) pendant la saison grippale 2006, nous avons créé un modèle pour saisir les coûts variables des cliniques de vaccination contre la grippe. Les frais promotionnels et les charges administratives ont été séparés des coûts des cliniques. Les charges de travail maximales du personnel sont estimatives. Les cliniques de vaccination ont été offertes par les effectifs de santé publique conformément aux normes administratives en vigueur.

Résultats : Les variables économiques les plus importantes des cliniques de vaccination contre la grippe sont les coûts en main-d'œuvre et le nombre de vaccins administrés par infirmière par heure. Les frais de location des installations étaient le seul autre élément de coût significatif. L'équilibre budgétaire des cliniques de vaccination contre la grippe dépend de leur capacité de gérer ces éléments de coût. Dans la CSWDG, pour les cliniques tenues les jours de semaine, le nombre de vaccinations par infirmière par heure était supérieur à 15, et pour les cliniques de fin de semaine, ce nombre était supérieur à 21. Nous estimons que 20 vaccinations à l'heure est le maximum pour accomplir le travail en toute sécurité pendant plusieurs heures. La gestion des coûts dépend ensuite de la réduction des coûts horaires en main-d'œuvre.

Discussion : Selon les résultats de l'analyse, en gérant les coûts de main-d'œuvre, en planifiant le volume de patients et en évitant les installations trop chères, les cliniques de vaccination contre la grippe font tout juste leurs frais. Le budget fixe de 5 \$ la dose devient insuffisant dès que les coûts augmentent (p. ex., s'il y a des hausses salariales négociées par convention collective ou si l'on opte pour des aiguilles de sécurité).

Mots clés : programmes de vaccination/aspects économiques; prestation des soins de santé/aspects économiques; vaccin contre la grippe/aspects économiques; coûts directs des services

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