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**TO:** Chair and members of the Board of Health

**MEETING DATE:** April 4, 2018

**REPORT NO:** **BH.01.APR0418.R10** Pages: 8

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## Recommendations

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It is recommended that the Board of Health:

1. **Receive this report for information.**

## Key Points

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- From January to December 2017, Wellington-Dufferin-Guelph Public Health (WDGPH) provided the total value of \$6,743,145.20 of vaccine to community partners in Wellington, Dufferin and Guelph.
- From January to December 2017, WDGPH had an overall wastage rate of 4.2% of vaccine by dose.
- WDGPH continues to maintain a comprehensive inventory and monitoring system to mitigate internal vaccine wastage.
- WDGPH will increase efforts to motivate our community partners to reduce preventable vaccine wastage.
- WDGPH will continue to work towards the goal of achieving the rate of individual vaccine wastage of < 5% annually.

## Discussion

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### Cold Chain

Vaccines require proper storage or they can lose their effectiveness. The consistent storage of vaccines within a temperature range of 2° and 8°C is known as maintaining "cold chain." Cold chain begins with manufacturing, moves through government distribution channels, and ends when the vaccine is administered. A vaccine is wasted if it is exposed to temperatures outside the appropriate range or expired before use. Vaccine wastage is a significant and preventable liability.

### Vaccine Distribution

WDGPH receives a weekly shipment of publicly-funded vaccine from the Ontario Government Pharmacy (OGP). Public Health is mandated to distribute this vaccine to physician's offices, long-term care homes, hospitals, community clinics and group homes. From January to December 2017, WDGPH provided the total value of \$6,743,145.20 in vaccine to community partners in Wellington, Dufferin and Guelph.

### Vaccine Wastage

The Ministry of Health and Long Term Care (MOHLTC) provides the Vaccine Storage and Handling Protocol 2018. This protocol was developed to achieve greater standardization in the management of provincial vaccine inventories, to ensure the proper storage and handling of vaccines, strengthen quality assurance activities and provide education strategies in an effort to minimize and reduce provincially-funded vaccine wastage and, lastly, to promote vaccine safety and efficacy.<sup>1</sup> This protocol requires that Health Units have no more than 5% wastage for any individual vaccine product annually. If wastage exceeds this level, the MOHLTC specifies that additional inventory control measures shall be taken to reduce it.

Public Health is mandated to report any publicly-funded vaccine deemed as wastage and return it to the MOHLTC. The Panorama Inventory Management Module, implemented in 2015, mid-year, has allowed WDGPH to monitor and track vaccine distributed to community partners with greater accuracy. WDGPH uses the Panorama Inventory system to assist community partners in managing vaccine ordering and inventory in ongoing efforts to decrease unnecessary wastage.

2017 is a benchmark year, as this is the first full calendar year that vaccine wastage has been tracked using specific formulas provided by the MOHLTC for calculating wastage. Subsequent year's wastage will be calculated in the same way and comparable to 2017, allowing WDGPH improved ability to monitor wastage reducing interventions. The overall wastage in 2017 for all vaccines distributed by WDGPH was 4.2% and valued at \$193,584.57.

Vaccines with a >5% wastage rate for an individual product are listed below in Figure 1. It is important to note that expired vaccines are not always returned to WDGPH in the calendar year that they are distributed. Therefore, the vaccine wastage rate can subsequently be higher than the number of vaccine distributed during that specific year. Influenza products are the most frequently wasted as they expire annually and demand for vaccine has traditionally been difficult for healthcare providers to accurately estimate.

**Figure 1. Individual vaccines with a >5% wastage rate**

Vaccine Name	Total wastage	Wastage Cost	Wastage %
VAQTA (paed) 0.5mL Vial, 1 Vial/Box	4	\$113.88	8.2%
HAVRIX 1440 (adult) 1mL Vial or Prefilled Syringe, 1 Vial or PFS/Box	28	\$1,102.92	24.3%
VAQTA (adult) 1mL Vial, 1 Vial/Box	9	\$354.51	6.1%
RECOMBIVAX HB Dialysis (adult) 1mL Vial, 1 Vial/Box	15	\$2,772.00	8.3%
Act-HIB 0.5mL Vial, 5 Vials/Box	18	\$780.30	75.0%
FLUMIST QUADRIVALENT 0.2ml Nasal Spray, 10NS/Box	1,000	\$18,000.00	46.8%
FLUAD 0.5mL PFS, 10 PFS/Box	136	\$1,693.20	755.6%
FLUZONE QUADRIVALENT 0.5 mL Pre-filled Syringe, 10 PFS/Box	666	\$8,624.70	11.3%
AGRIFLU 5 mL Vial, 1 Vial/Box	535	\$4,528.78	382.1%
FLULAVAL TETRA 5 mL Vial, 1 Vial/Box	179	\$2,228.55	8.0%
FLUZONE QUADRIVALENT 5mL Vial, 1 Vial/Box	468	\$5,826.60	34.4%
BEXSERO Men-B 0.5ml PFS 1/Box	2	\$204.22	7.4%
Pro-Quad 0.5 ml Vial 10/Box	302	\$29,374.03	14.4%
PNEUMOVAX 23 0.5mL Vial, 10 Vials/Box	312	\$6,015.36	7.3%

### Accountability Indicators

In addition to comprehensive vaccine wastage monitoring, WDGPH has 3 specific accountability indicators related to vaccine wastage, reported annually to the MOHLTC. These indicators are not always calculated by calendar year, but are calculated as per request by the MOHLTC as noted in Figure 2. The indicators relate to the effectiveness of vaccine storage, handling and management practices by the public health unit and health care providers. There are significant opportunities for cost savings by employing efforts to reduce vaccine wastage, setting the stage for vaccine wastage reduction as priority for the MOHLTC. The Vaccine Storage and Handling Protocol 2018, requires that vaccine wastage should not exceed 5% for any one product.<sup>1</sup> Figure 3 provides data for one accountability indicator relating to annual inspections of healthcare provider vaccine refrigerators.

- Indicator 4.1 monitors the percentage of HPV vaccine wasted that is stored/administered by the public health units.
- Indicator 4.2 monitors the percentage of influenza vaccine wasted that is stored/administered by the public health unit, health care providers & pharmacies.
- Indicator 4.7 monitors the percentage of wastage of publicly-funded measles, mumps and rubella (MMR) vaccine that is stored, transported, or administered by public health units and health care providers.
- Indicator 4.3 monitors the % of refrigerators storing publicly-funded vaccines that have had an annual cold chain inspection conducted by public health.

**Figure 2. Wastage related accountability indicators reported in 2017**

Accountability Indicators 2017	Timeframe	MOHLTC requirement for wastage	Wastage %
4.1 HPV vaccine wastage	Sept 2016 – Sept 2017	< 5%	0.28 %
4.2 Influenza vaccine wastage	Sept 2016 – Sept 2017	< 5%	7.90 %
4.7 MMR vaccine wastage	Jan 2017 – Dec 2017	< 5%	4.60 %

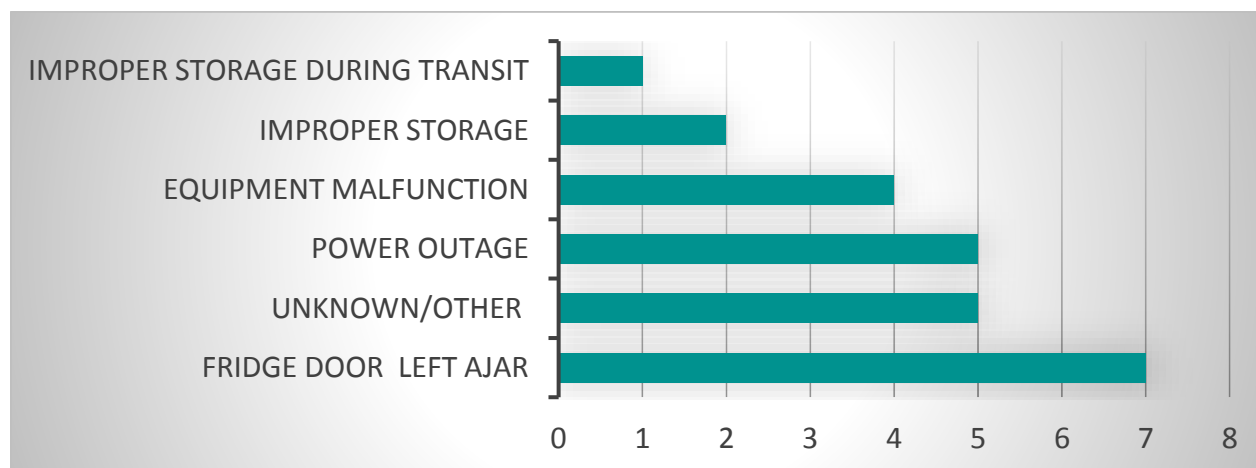
**Figure 3. Annual cold chain inspections for healthcare providers**

Accountability Indicators January – December 2017	# of Facilities requiring annual cold chain inspection	Completed annual cold chain inspection
4.3 The percent of refrigerators storing publicly funded vaccines that have been inspected by public health	240	100%

### Community Cold Chain Excursions

WDGPH Cold Chain team responded to 24 cold chain excursions reported by community healthcare providers in 2017, shown in Figure 4. This process involves assisting the healthcare provider resolve the immediate cold chain issue and following up with the vaccine manufacturer(s) in regard to the time and duration of exposure to assess whether the vaccine can be used or must be wasted. Expired vaccine and not cold chain excursions is still the most common cause for vaccine wastage in the community.

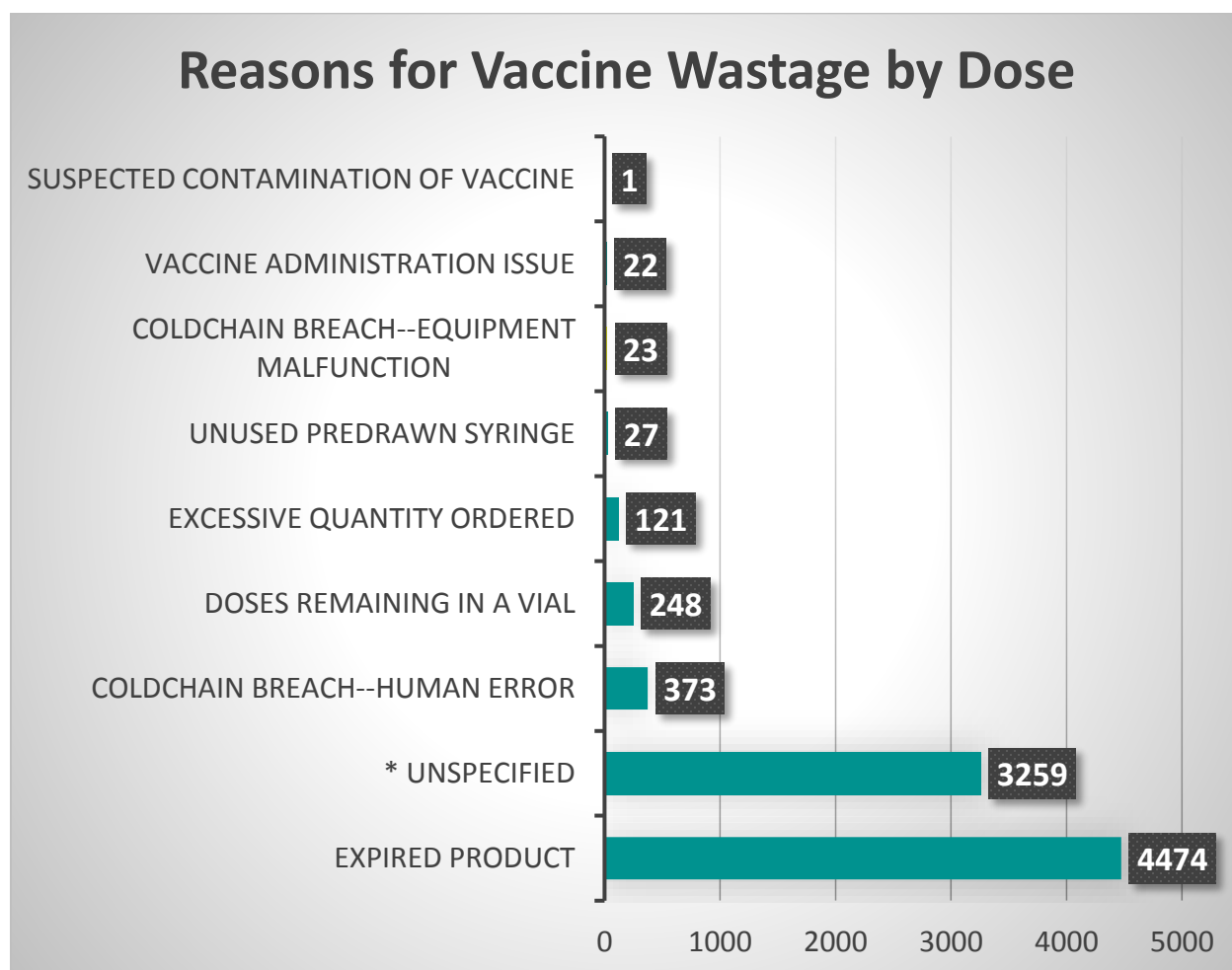
**Figure 4. Rationale for cold chain excursions in the community**



### Challenges and strategies for mitigation:

Vaccine distributed in the community cannot be returned for redistribution and any vaccine that cannot be used is considered to be wasted. Vaccine distributed to community partners is the driving factor behind the high amount of vaccine wastage reported by WDGPH and is difficult to mitigate without negatively affecting service to clients. For example, if vaccine is too closely rationed via inventory controls, clients may miss an opportunity to be vaccinated during a routine visit to a healthcare provider due to limited supply of vaccine, on site. WDGPH depends on community partners diligently monitoring their own vaccine supply and demand, and ordering accordingly. A portion of the overall wastage fluctuations can be attributed to community partners returning vaccine from previous year(s) rather than during the same year that the vaccine was distributed. Oftentimes this expired vaccine is discovered and returned to WDGPH during annual cold chain inspections. Figure 5 below outlines the rationale provided for the 8,548 doses of wasted vaccine in 2017.

**Figure 5. Vaccines returned to WDGPH**



\* Unspecified wastage is expired vaccine returned to WDGPH that was returned without a specific reason provided by the HCP. Most vaccines returned as unspecified are influenza products collected at the end of the season.

WDGPH monitors vaccine orders that come in from facilities by requesting an accurate count of office inventory on the order form. Distribution is then adjusted accordingly. Sometimes the inventory on hand is not accurately recorded, resulting in providers ordering more stock from WDGPH than they can use before it expires.

Additionally, some health care providers are accustomed to ordering influenza vaccine based on the numbers of doses given in previous years. However, the distribution trend for influenza vaccine continues to shift with an increased number of doses administered by pharmacists. WDGPH reminds all health care providers to order only a 2 week supply of any vaccine in order to minimize the potential for wastage.

The WDGPH Cold Chain team maintains efforts to engage community partners in putting increased attention on vaccine cold chain management. In November 2017, healthcare providers were provided with the opportunity to participate in a vaccine education event where cold chain and vaccine wastage prevention was a highlight of the education provided by WDGPH staff. In 2018, each community healthcare provider will receive an individual report including the value of the vaccines wasted in their facility, in 2017, to assist in increasing awareness of the costs associated with wastage. Consistent measures taken to reduce wastage include:

- Annual cold chain inspections for all facilities;
- Spot inspections following cold chain incidents;
- Education as per the Vaccine Storage and Handling Protocol 2018 is provided to healthcare providers at time of a cold chain incident and at annual inspections;
- Encourage community partners to invest in vaccine specific fridges that hold temperatures more consistently;
- Limit vaccine stock in facilities;
- Stickers with reminders to return expired vaccine with each new order, report fridge temperatures outside the 2 and 8 degree range and rotate vaccine inventory are added to every order distributed;
- During on-site cold chain inspections, healthcare providers are reminded to order a maximum of a 2 week supply and return expired vaccine immediately;
- Expired vaccine on hand is collected at the time of inspection; and
- Collaboration with the Provincial Panorama group to develop guidelines for monitoring vaccine in the community, addressing issues such as vaccine expiry and vaccine quantity stored.

Over the past several years, WDGPH has developed a highly effective process for internal vaccine and cold chain management. Only 13.5% of the overall wastage is internal. Bi-Weekly inventory counts are completed in each office and internal stock requisitions are adjusted accordingly. During these inventory counts, vaccine expiry dates are checked and those vaccines with an approaching expiry date of 3 months or less are flagged for immediate use and redistribution. To manage risk for cold chain excursion in our community clinics WDGPH procured portable cooling systems that guarantee to keep vaccine within the recommended temperature range for up to 65 hours. These cooling systems have been functioning without issue in our community clinics and are available to aid in power outages, emergency responses and fridge failures. WDGPH has additional monitoring requirements for on-site vaccine fridges including a comprehensive Hoboware monitoring system.

The Hoboware system was implemented in 2015. This system provides connection information in 10 minute intervals and records data every 5 minutes. Each fridge has 2 sensors. One monitors the fridge temperature and the other sensor monitors the voltage. Vaccines must be

stored within the temperature range of 2°C to 8°C. When temperatures go outside the range of 2°C - 7°C an audible alarm is initiated and messages are sent to pre-determined WDGPH staff. This alarm range provides enough time to transfer vaccine, if needed, to another fridge and/or trouble shoot to why the temperature is too high or too low. Notifications are also provided when the sensors have missed a connection and are not relaying information to the Hoboware. Alarms are emailed and phoned in to the appropriate WDGPH staff with the time of the incident, and related information such as temperature at time of alarm, voltage at time of alarm and or time of missed connection. There is a contingency plan in place 24 hours per day to manage internally housed vaccine that might be at risk. Figure 6 provides an overview of the usefulness of this monitoring system from January 1 to December 31, 2017. No vaccine was wasted during this period due to out of range temperatures at the WDGPH offices.

**Figure 6. Hoboware alarm system report**

<b>January 1, 2017 – December 31, 2017</b>			
<b>Office</b>	<b>Number of Alarms</b>	<b>Reason</b>	
<b>Chancellor's Way Clinical</b>	10	Missed Connection or spike in temperature - highest temp of 7.19°C	
<b>Chancellor's Way Vaccine Room</b>	18	Missed Connection or spike in temperature - highest temp of 8.54°C (vaccine removed prior to temperature reaching 8°C)	
<b>Fergus Office</b>	25	Missed Connection, Voltage/Sensor alarm, High temperature - highest temp of 7.64°C	
<b>Shelldale Office</b>	12	Missed connection, Voltage Alarm or spike in temperature – highest temp of 7.42°C	
<b>Orangeville Office</b>	31	Missed connection, Voltage Alarm or spike in temperature - highest temp of 7.02°C	
<b>Mount Forest Office</b>	265	Missed connection, or Voltage Alarm	
<b>Total Alarms:</b>	<b>361</b>		

## Conclusion

WDGPH has gone above and beyond MOHLTC recommended processes to eliminate vaccine wastage within our control. While WDGPH has successfully implemented internal processes to protect our vaccine supply, the greater challenge lies with engaging our community healthcare providers to acknowledge the importance of vaccine cold chain and inventory management. WDGPH will increase our efforts with front line health care providers to improve the awareness of and adherence to the guidelines for proper vaccine storage.

## Ontario Public Health Standard

### Vaccine Preventable Diseases

Goal: To reduce or eliminate the burden of vaccine preventable diseases

#### Board of Health Outcomes:

- Health care providers are knowledgeable of improved practices related to proper vaccine management, including storage and handling.
- Health care providers adhere to proper vaccine management, including storage and handling practices and inventory management.
- Vaccines are distributed in an equitable and timely manner that adheres to proper vaccine management, including storage and handling practices.

## WDGPH Strategic Direction(s)

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**Health Equity:** We will provide programs and services that integrate health equity principles to reduce or eliminate health differences between population groups.

**Organizational Capacity:** We will improve our capacity to effectively deliver public health programs and services.

**Service Centred Approach:** We are committed to providing excellent service to anyone interacting with WDG Public Health.

**Building Healthy Communities:** We will work with communities to support the health and well-being of everyone.

## Health Equity

Publicly-funded vaccines are available to all community members who have a primary healthcare provider. For community members without a primary healthcare provider, vaccines can be readily accessed through any of our public health offices.

## References

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1. Population and Public Health Division, Ministry of Health and Long-Term Care. Vaccine Storage and Handling Protocol 2018.

## Appendices

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None.