



Development and Use of Electronic Spreadsheet Tools to Manage Vaccine Inventory and Ordering in a Community Health Setting

Background

With increased numbers of vaccines routinely recommended, large and costly amounts of both VFC and privately purchased vaccine are ordered at our Denver Health clinics. To educate vaccine ordering staff and reduce potential loss of vaccines due to large inventories on hand, a standardized system for tracking usage and ordering vaccines to maintain adequate levels was sought.

Our Agency and Community Health System

Denver Health serves the City and County of Denver with multiple components including a 500-bed inpatient hospital, Level 1 Trauma Center, County Public Health Department, and a Community Health Services division with family health centers spanning 8 geographic locations and 13 school-based health centers.

Community Health Services cares for 112,000 patients at Internal Medicine, Pediatric, Women's Care and Family Practice centers and administered 171,046 pediatric, adolescent and adult vaccinations in the year 2009.

Project Overview

A comprehensive vaccine ordering and receiving guide was developed, with five accompanying electronic worksheets. The first worksheet tracks the number of doses used of both VFC and privately purchased vaccines, calculates the monthly average usage, and determines a 45-day level or "par". The par is then linked to the next two worksheets (one for VFC vaccines and one for privately purchased vaccines) which tracks current inventory levels and provides suggested amounts of vaccine to order to maintain the 45-day level. Another page monitors ongoing flu orders and shipments received. The final tool is a table for converting vaccine dosage volumes. Each workbook is adapted to become a site-specific tool based on that clinic's inventory. After piloting at a Pediatric Clinic, the tools were refined and trialed at two Family Practice sites before expansion to all Community Health ordering sites. Roll out to Adult patient care sites ordering only privately purchased vaccines will follow.

Discussion

Results include:

- Increased compliance with VFC guidelines to maintain a 30–45 day inventory of vaccines.
- Minimized the potential for loss in a cold chain event while ensuring an adequate supply of all vaccines.
- Reduced on hand inventory documented at pediatric pilot site based on 5/2010 vs. 2/2011 one day snapshot of current vaccine volume. With the roll out and refining of tools during monthly visits by the Immunization Program Office nurse, vaccine inventory was reduced from 3,939 doses before the pilot to 2,152 doses after the tools were initiated (45% reduction). The value of the vaccine was reduced from \$176,695 to \$95,663 (46% reduction).
- Written ordering guidelines for both current and future Immunization Champions and their back up staff.
- Site-specific review of best practices for immunization ordering and handling with the Immunization Champion at each clinic was accomplished by individualized roll out of the tools.

Future Plans:

- Standardization of the ordering process for both VFC and privately purchased vaccines across the agency.
- Roll out to Adult sites that order only privately purchased vaccines

Yearly Vaccine Count worksheet

This worksheet helps sites track month by month the vaccine usage for both pediatric and adult vaccines over the course of the year and determines their clinic's monthly averages and their 45-day par. The Immunization Champion at each site enters the data which is obtained from our Denver Health immunization registry for the previous month for each type of vaccine. For seasonal vaccines, i.e. Influenza, N/A is built into the "non-flu" months to maintain a true monthly average. The par information will be automatically transferred by an electronic link in Excel to the appropriate *VFC* or *Privately Purchased Monthly Vaccine Supply* worksheet on the next two tabs in the workbook.

Vaccine Usage - 2010	Jan	Feb	March	April	May	June	July	Aug	Sept	Oct	Nov	Dec	Cumulative Total	Monthly Average	45-day par to Vac. Supply Count sheets
DTaP (example)	133	117	125	123	95	85	118						796	114	171
DT	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DTaP-HepB-IPV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
DTaP-IPV/Hib	34	58	51	41	34	44	41	35	27	42	36	46	489	41	61
DTaP	42	39	39	34	26	3	0	28	34	47	37	27	356	30	45
HepA - Adult	1	0	2	0	0	1	1	3	1	0	0	1	10	1	1
HepA - Pediatric	53	50	50	39	49	46	39	51	43	47	46	35	548	46	69
HepB - Adult	3	0	3	1	1	1	2	2	1	0	0	3	17	1	2
HepB - Pediatric	22	43	43	31	25	37	43	37	23	27	24	32	387	32	48
HepB-Hib	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Hib	34	30	26	33	26	24	11	23	13	16	19	16	271	23	34
HPV4 - Adult	2	1	0	1	1	2	5	2	3	6	5	0	28	2	4
HPV4 - Pediatric	21	16	18	20	39	54	60	88	48	44	61	39	508	42	64
Influenza-LAIV	41	0	0	N/A	N/A	N/A	N/A	N/A	N/A	7	232	171	115	566	81
Influenza-TIV - Adult	63	36	2	N/A	N/A	N/A	N/A	N/A	N/A	36	550	287	230	1204	172
Influenza-TIV - Pediatric	125	131	12	N/A	N/A	N/A	N/A	N/A	N/A	4	200	135	92	699	100
IPV - Adult	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
IPV - Pediatric	27	27	26	14	22	26	18	45	29	27	22	14	297	25	37
MCV4 - Adult	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
MCV4 - Pediatric	18	9	18	12	11	13	22	32	19	8	14	17	193	16	24
MMR - Adult	0	0	1	1	0	0	0	0	0	0	1	1	4	0	1
MMR - Pediatric	42	41	38	30	39	38	22	50	36	40	40	26	442	37	55
MMRV	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Pneumococcal (PPSV23) - Adult	32	15	28	28	13	20	25	25	13	27	22	19	267	22	33
Pneumococcal (PPSV23) - Pediatric	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0
PCV7	57	78	67	46	0	0	0	0	0	0	0	0	248	21	31
PCV13	0	0	0	16	55	65	48	51	36	59	54	61	445	37	56
Rotavirus (RV5)	26	42	37	37	23	33	30	26	18	35	31	38	376	31	47
Td - Adult	52	36	35	38	25	45	45	18	14	31	25	41	405	34	51
Td - Pediatric	0	0	2	2	0	0	1	0	2	0	0	0	7	1	1
Tdap - Adult	16	6	14	9	13	9	7	13	13	17	11	8	136	11	17
Tdap - Pediatric	16	7	17	13	12	13	21	30	19	8	14	17	187	16	23
Varicella - Adult	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Varicella - Pediatric	59	48	47	40	45	43	28	62	41	46	45	31	535	45	67
Total	786	713	576	487	459	517	469	621	480	1509	1100	909	8626	719	1078

Yearly Vaccine Count | VFC Monthly Vac. Supply Count | Privately Pur Vac. Supply Count | Influenza Order Tracking | Vaccine Conversion Table

Monthly Vaccine Supply worksheets

These two worksheets, one for VFC and one for privately purchased vaccines, list the number of doses the site currently has on hand, what a 45-day supply or par would be, and the number of doses to order to maintain an appropriate vaccine volume. Desired par level information (transferred electronically from the *Yearly Vaccine Count* worksheet) has been pre-populated. Immunization Champions complete a monthly hard count (physical count of actual vaccines in refrigerator/freezer) and enter that information in the appropriate column. The worksheet will subtract the current supply from the par to determine the amount of each vaccine to order. Negative numbers will occur if the site has more vaccine on hand than needed for a 45-day supply.

Vaccine Type	Doses needed for a 45-day supply from Yearly Vaccine Count	Date counted	Hard Count - Vaccine supply on hand	VFC Vaccine doses to order	Additional comments
DTaP (example)	171	01/25/2010	140	31	Column G (31 doses) is calculated for you
DT	0	01/14/2011	5	-5	Site-Specific preferences for brand or packaging are listed here
DTaP-HepB-IPV	0	01/14/2011	0	0	
DTaP-IPV/Hib	61	01/14/2011	25	36	
DTaP	45	01/14/2011	20	25	
Hep A	69	01/14/2011	35	34	
Hep B	48	01/14/2011	25	23	
HepB/Hib	0	01/14/2011	0	0	
HIB	34	01/14/2011	19	15	
HPV4	64	01/14/2011	30	34	
IPV	37	01/14/2011	12	25	
MCV4	24	01/14/2011	10	14	
MMR	55	01/14/2011	27	28	
MMRV	0	01/14/2011	0	0	
Pneumococcal (PPSV23)	0	01/14/2011	3	-3	
PCV 13	56	01/14/2011	61	-5	
Rotavirus (RV5)	47	01/14/2011	35	12	
Td	1	01/14/2011	5	-4	
Tdap	23	01/14/2011	7	16	
Varicella	67	01/14/2011	24	43	

Yearly Vaccine Count | VFC Monthly Vac. Supply Count | Privately Pur Vac. Supply Count | Influenza Order Tracking | Vaccine Conversion Table

Vaccine Type	Doses needed for a 45-day supply from Yearly Vaccine Count	Date counted	Hard Count - Vaccine supply on hand	Privately Purchased Vaccine doses to order	Additional comments
Tdap (example)	38	09/10/2010	25	13	Column G (13 doses) is calculated for you
Hep A - Adult	1	01/14/2011	5	-4	Site-Specific preferences for brand or packaging are listed here
Hep B - Adult	2	01/14/2011	2	0	
HPV4 - Adult	4	01/14/2011	7	-4	
IPV - Adult	0	01/14/2011	5	-5	
MCV4 - Adult	0	01/14/2011	1	-1	
MMR - Adult	1	01/14/2011	2	-2	
Pneumococcal (PPSV23)	33	01/14/2011	12	21	
Td - Adult	51	01/14/2011	16	35	
Tdap - Adult	17	01/14/2011	7	10	
Varicella - Adult	0	01/14/2011	0	0	

Yearly Vaccine Count | VFC Monthly Vac. Supply Count | Privately Pur Vac. Supply Count | Influenza Order Tracking | Vaccine Conversion Table

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