GBHN Order Set Project
Audit 2008-9

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1   Background

In Winter/Spring 2009, the Evidence-Based Care Program performed a chart audit on 10 of the 90 order sets in use for the time period February 2008-February 2009. 1847 charts were chosen using convenience sampling methodology, and were reviewed across all sites in the Network. The following diagnoses were reviewed:

- Acute Coronary Syndromes (ACS)
- Community-Acquired Pneumonia (CAP)
- Chronic Obstructive Pulmonary Disease (COPD)
- Congestive Heart Failure (CHF)
- Febrile Neutropenia (FN)
- Total Hip Replacement (THR)
- Fractured Hip (FH)
- Stroke (SK)
- Vaginal Birth (VB)
- Caesarean Section (CS)

These diagnoses were chosen as they are the highest volume/problem areas across the Network sites. Several sites were live with CareNet and thus had electronic nursing documentation for a portion of the audited year. The audit looked at 1586 paper charts, and 261 electronic charts across the Network

2   Order Set Usage

Usage of the GBHN order sets audited averaged 36% across all sites in the Network, which was similar to the 2007 audit, which averaged 35%. This was extremely variable across the sites, as can be seen below – with a range of 9% to 63%. The audit also noted order sets that were used for a diagnosis, but were not GBHN order sets. It was also noted that across sites and diagnoses, many older versions of order sets (pre-GBHN project) and corporate order sets are still being used. If these "other" order sets are added to the GBHN Order Set usage, usage across all sites improves to 49%, with a range of 11% to 82% across sites.

It should be noted that during this time frame, many sites were focusing on training for electronic documentation, and so not a lot of focus was on implementing order sets. In addition, the training for electronic documentation did not emphasize the electronic order sets. Thus there was not an expectation that there would be an increase in the past year. It is hoped that in the coming year, several strategies that are being put into place will increase order set usage.

Order Set Usage - GBHN vs Non GBHN
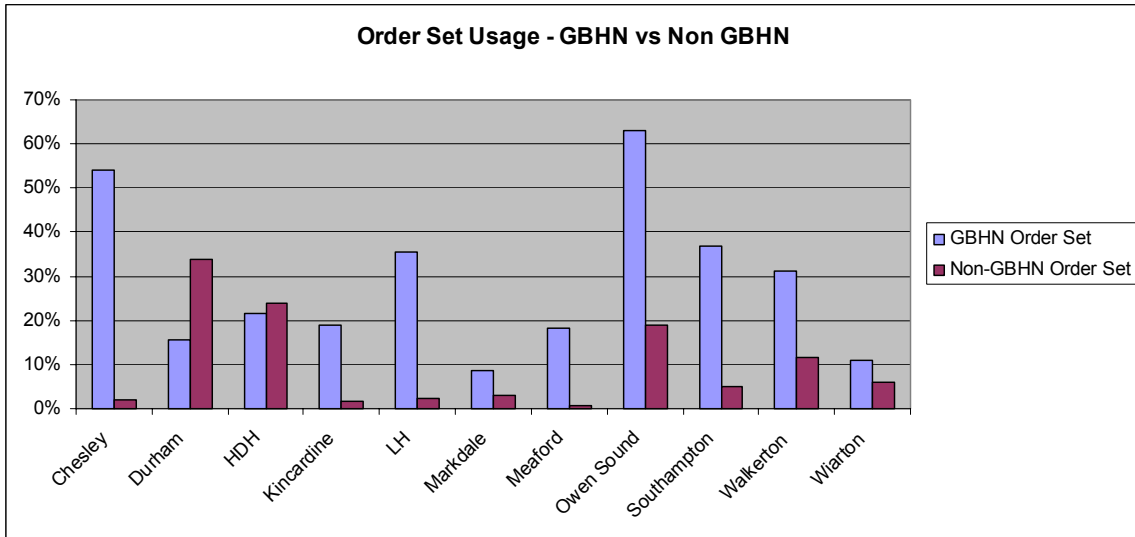
Usage of order sets across the 10 diagnoses also varied considerably. It is noted that ACS had the highest use, with 56% usage across Network sites, compared to 52% in 2007. The lowest used order set was CHF, at 15%, compared to 14% in 2007.

As above, adding in the non-GBHN order sets into this calculation improves usage considerably and variably across diagnoses. The range improves, lowest being 21% for CHF, up to 96% for VB. This information will be used to communicate to units using older sets to ensure they download the most recent version off the Order Set Website. This is particularly relevant for VB and CS, where 50-60% of order set usage is non-GBHN approved.

Order Set Usage
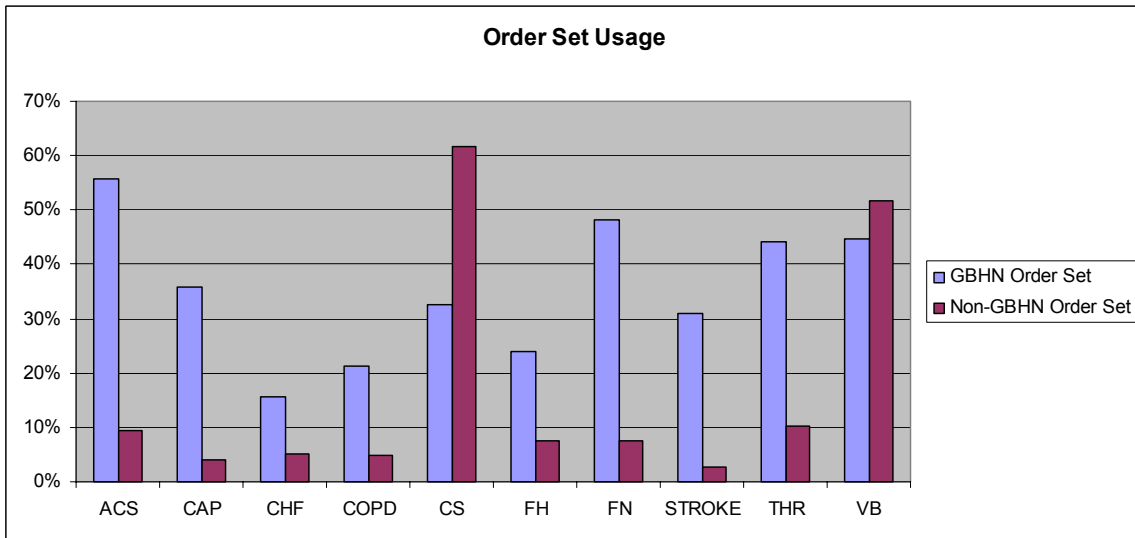
The program will also endeavour to develop any order sets found in use in the audit that have not been converted to the new GBHN format. Some order sets found in the audit that were not GBHN approved at the audit time have since then been approved and are hopefully in use on those units.

Usage of order sets in a paper vs. electronic (live in CareNet) environment differed slightly as well. Consistently usage went down in the time period a site was live with CareNet. This is perhaps due to the focus on CareNet training at these sites, and not a lot of focus on the electronic order sets in the training

Site	Difference in Usage
Chesley	(5.4%)
Durham	(13.3%)
Kincardine	(1.2%)
LH	(6.7%)
Meaford	(1.6%)
Wiarton	(8.7%)

The remainder of the report will be looking only at GBHN Order Set usage, as the key indicators measured are found on these order sets.

3 Utilization Management Indicators

3.1 Order Set Usage and Length of Stay

Average length of stay when GBHN order sets were used was 4.88 days. Average length of stay for use of a non standard order set or no order set was 5.84 days.   This is a statistically significant decreased length of stay (regression analysis $p<0.05$, controlled for age, sex, RIW and RIL).

There is also a statistically significant difference LOS when any order set was used compared to no order set used. Use of any order set resulted in an average LOS of 4.52 days. The average LOS when no order set was used was 6.92 days.

Note: These results removed FH and THR diagnoses at the rural sites from the comparison, as these diagnoses are used for convalescent care of these conditions at the rural sites, and so were a significant confounder.

This difference was variable across sites:

Avg of LOS Days / Site & Order Set used
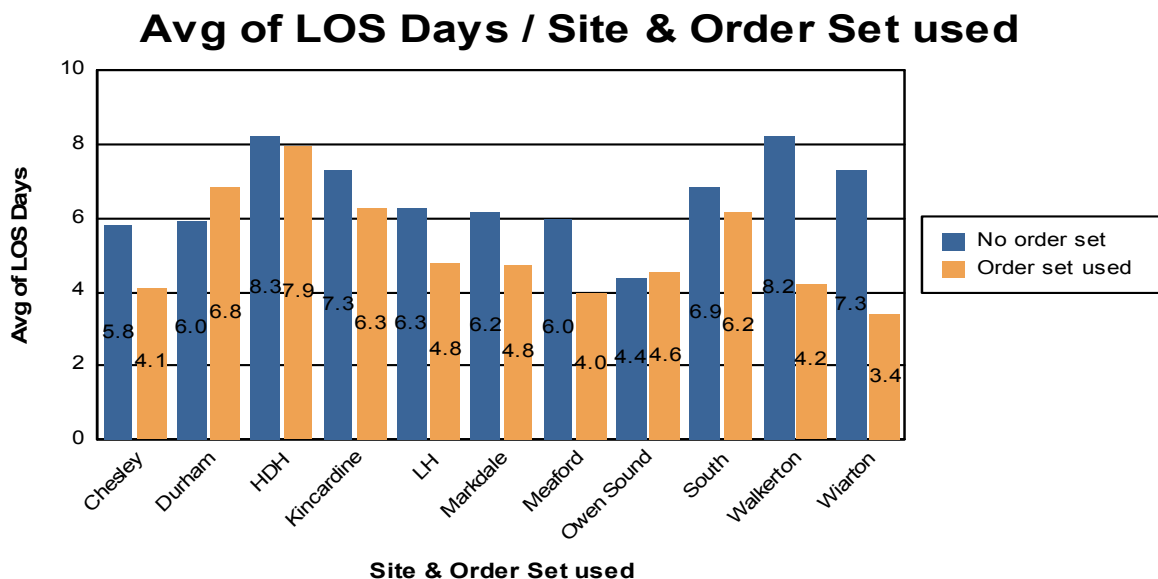
This translates into an a decrease in potential days per patient, which can be extrapolated to a total of 398 days saved through using order sets across the Network.

| Corporation	Average Actual Decrease in LOS with Order Set Usage	Current Usage	If Usage Reaches 80% Benchmark
		Potential Days Saved	Potential Days Saved
Owen Sound	(0.2)	(64)	(82)
GBHS rural sites	1.44	167	819
HDH	.4	11	39
SBGHC	2.2	284	491

There was also variation across diagnoses. Most of the surgical order sets showed a decrease in LOS, while the medical order sets were variable. Of the medical diagnoses, CHF showed the largest decrease when order sets were used.

Avg of LOS Days / Diagnosis & Order Set used
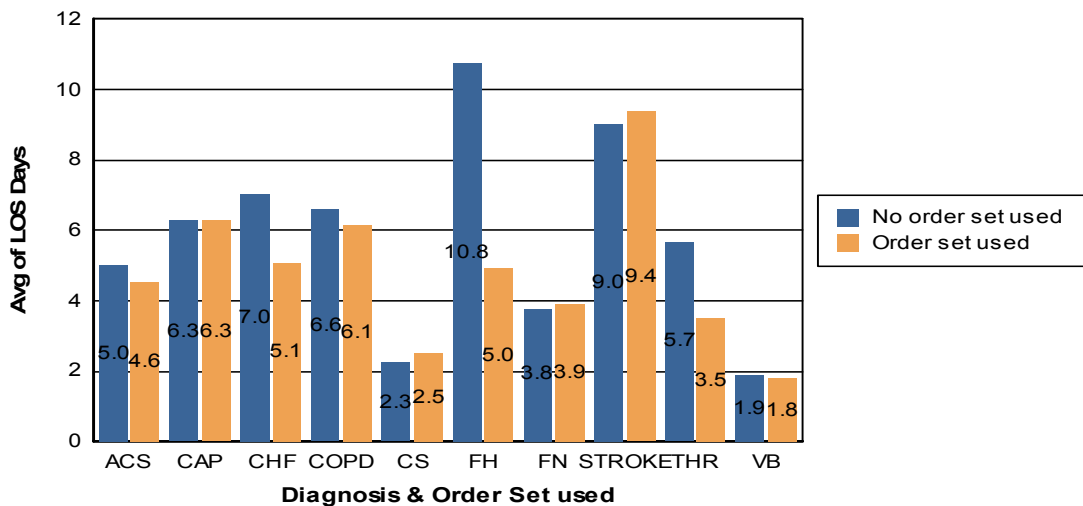
Note: FH and THR data includes convalescence cases at the rural sites, where order sets were rarely used. This accounts for the large differences in LOS between order set use and non use.

3.2 Readmissions and Order Set Usage

Another measure looked at in the audit from a utilization management standpoint was readmissions and order set usage. Readmissions with an unrelated diagnosis within one week were found to be down – 4.8% in the non order set group, to 2.5% in the order set group. In addition, readmission with the same or related diagnosis within 1 month were also down – 3.5% with order set vs 5.5% with no order set.

4 Quality of Care Improvement with Order Set Use

This audit looked at quality of care in orders, comparing order set use to non-order set use. The intent was to find out if utilizing order sets made for better quality care, i.e. more comprehensive orders, following policies and procedures, improving patient flow, or best practices usage. Some of the quality of care indicators studied in this audit were found on all order sets, and thus are presented across the entire audit.

Please note that the audit looked only at orders on admission, and not any orders added later in the hospital stay. Thus it can't be concluded that the orders were never ordered, but that they were not ordered on admission, which is the most efficient for patients and for staff. Comprehensive orders on admission will improve efficiencies, as it saves nursing and physician time since orders don't have to be added later. Patient satisfaction improves, as orders are more timely. Finally, LOS and patient outcomes are improved, as orders are processed faster and are completed in a timely manner.

4.1 General Orders

There was a definite improvement in basic order utilization such as height and weight, diet, and activity orders.

Order	% Ordered using GBHN order set	% Ordered not using GBHN order set	Relative increase in ordering using GBHN order set
Height and Weight on admission	62%	30%	1.1
Diet	97%	85%	0.1
Activity	95%	68%	0.4

Legibility is also a factor in physician ordering. It was found that with order sets, 62% of the time the orders were found to be 100% legible, but only 34% of the time with handwritten orders. When orders are less than 100% legible, often a call back for clarification is required.

4.2 Protocol Usage

Through the order sets project a number of new protocols were created to aid in the flow of patient care. It was found that these protocols were used often when an order sets was used, but much less often in the non-order set group.

Protocol	Usage with Order Sets	Usage with no Order Set	Relative Increase in Usage with Order Sets
Bowel Care Protocol	28%	13%	1.2
Hypoglycemia Protocol	5%	0.5%	9.0
New Diarrhea Protocol	1%	0%	1.0
Potassium Oral Dosing Protocol	11%	3%	2.7

Protocol	Usage with Order Sets	Usage with no Order Set	Relative Increase in Usage with Order Sets
Subcutaneous Insulin Protocol	3%	1%	2.0
DVT Protocol	28%	23%	0.2

This data shows a need to enhance awareness around these protocols, which could be used on a larger number of patients than current practice. In many of the order sets that have undergone review in the past few months, these protocols are being pre-ticked, as they are only used when needed, and so this should also increase usage of the protocols.

4.3 Convenience orders

Convenience orders are defined as orders put in an order set to reduce call-backs to the physician for common medications used on an as-needed basis. It was found in the audit that these convenience orders, that are built into the GBHN order sets where appropriate, were more often ordered using an order set than when orders were handwritten.

Order	Usage with Order Sets	Usage with no Order Set	Relative Increase in Usage with Order Sets
Acetaminophen PRN	68%	34%	1.0
Dimenhydrinate PRN	46%	14%	2.3

This again improves efficiency, reducing the additional nursing and physician time in ordering these "as needed" orders later. Patients also get timely access to these orders as needed, as there is no delay in getting the orders, improving patient outcomes and patient satisfaction.

4.4 Order Set Specific Indicators

Each order set looked at a subset of indicators specific to that diagnosis, based on best practices or external/internal indicators. It was seen fairly consistently that with order set usage, most indicators improved with order set usage, indicating more comprehensive and higher quality care for the patient.

4.4.1 ACS

This order set is one of our highest used medical order sets across the sites. For the most part, it can be seen that usage of the order set increases quality of patient care and comprehensiveness of ordering. There are a few anomalies in the data, which prompted some changes to the order set in the biannual review.

Order	% Ordered using GBHN order set	% Ordered not using GBHN order set	Relative increase in ordering using GBHN order set
Patient Care			
Intake and output x 24 hours	95%	19%	4.0
Laboratory			
PT/PTT	96%	28%	2.5
Lipid profile	95%	30%	2.2
Fasting Glucose	95%	25%	2.8
Diagnostics			
ECG Daily x 2	78%	41%	0.9
Medications			
Enoxaparin	77%	48%	0.6
Plavix loading dose	42%	31%	0.4
Plavix daily dose	56%	52%	0.1
ASA Chewable STAT	90%	37%	1.4
ASA Daily	61%	65%	0.0
Ace Inibitor	59%	51%	0.2
B Blocker	74%	61%	0.2
ARB	8%	14%	(0.3)
Statin	67%	59%	0.1
Tirofiban	0%	1%	0.0
Warfarin	7%	4%	0.8
Atropine	95%	14%	5.8
Nitroglycerin	97%	64%	0.5
Morphine	47%	28%	0.7

4.4.2 Caesarean Section

Order set usage in this diagnosis has a large uptake; however usage of the approved GBHN Order Set is low. Many of the sites are using older version of the order set, as was found during the audit. This data captures GBHN Order set usage, and the second column will include both handwritten orders as well as the non-approved older versions of order sets. This highlights the need for departments and programs to ensure the most recent version of an order set is used by staff.

The data does show one instance of an order (Acetaminophen with codeine) that perhaps needs revision, as ordering went down with usage of the order set.

Order	% Ordered using GBHN order set	% Ordered not using GBHN order set	Relative increase in ordering using GBHN order set
Patient Care			
D/C Catheter 8h pp if stable and ambulating	79%	45%	0.8
Discharge IV when fundus firm, lochia moderate and ambulating	75%	5%	14.0
Medications			
Zinc Sulfate	68%	5%	12.6
Docusate Sodium	71%	33%	1.2
Magnesium Hydroxide/Mineral Oil	68%	7%	8.7
Follow post op Anaesthesia Orders	75%	22%	2.4
Acetaminophen	64%	33%	0.9
Ibuprofen	32%	17%	0.9
Acetaminophen with codeine	11%	26%	(0.6)
Naproxen Sodium	4%	5%	(0.2)

4.4.3 COPD

This order set was one of our lowest used across all order sets. However it can be seen from the data below that there is a definite increase in quality and comprehensiveness of orders when it is used.

Order	% Ordered using GBHN order set	% Ordered not using GBHN order set	Relative increase in ordering using GBHN order set
Moxifloxacin	51%	19%	1.7
Azithromycin	20%	10%	0.1
Antibiotic IV to PO after one dose	29%	19%	0.1
Salbutamol	97%	82%	0.2
Ipatropium	60%	55%	0.1
Tiotropium	26%	38%	(0.1)
Salmeterol	14%	22%	(0.1)
Fluticasone	43%	24%	0.2
Methyprednisone/Prednisone	74%	53%	0.2
Nicotine patch	9%	3%	0.1
Nicotine Gum	3%	1%	0.0

4.4.4 Congestive Heart Failure

This was the lowest used of all order sets; however saw the greatest benefit when order sets were used, both from a quality care perspective and a utilization management perspective.

Order	% Ordered using GBHN order set	% Ordered not using GBHN order set	Relative increase in ordering using GBHN order set
Consults			
Referral to CHF clinic	18%	0%	18*
Referral to Cardiac Rehab	3%	0%	3*
Referral to healthy heart Program	9%	1%	8.0
Patient Care			
Chart fluid intake and output x 24 hours	82%	19%	3.3
Laboratory/Diagnostics			
PT/PTT	36%	20%	0.8
Fasting Glucose	33%	15%	1.2
Echocardiogram	18%	10%	0.8
Medications			
ASA chewable STAT	70%	5%	13.0
ASA Daily	48%	39%	1.2
Ace Inibitor	55%	46%	0.8
B Blocker	67%	41%	0.6
ARB	24%	10%	1.4
Statin	52%	42%	0.2
Nitroglycerin	61%	43%	0.4
*Absolute increase shown due to zero usage with no GBHN order set			

4.4.5 Community Acquired Pneumonia

This order set is another order set that has been in place at GBHN for many years, and so many of the indicators have been met over a number of years. Thus the audit looked at only a limited number of indicators. It can still be seen that there is improvement of ordering with usage of an order set vs non order set usage.

Order	% Ordered using GBHN order set	% Ordered not using GBHN order set	Relative increase in ordering using GBHN order set
Antibiotic First dose STAT	98%	55%	0.8
Antibiotic IV to PO after one dose	87%	51%	0.7
Salbutamol	72%	54%	0.3
Ipatropium	56%	33%	0.7

4.4.6 Febrile Neutropenia

This order set has clear direction for a diagnosis that is not well known but for which there is urgency for treatment. Low volumes of this patient diagnosis make for larger differences in percentages, but it is clear that usage of the order set improves the quality of patient care. This data does show that the order set is not used on Low Risk patients, and perhaps a revision needs to be made based on this.

Order	% Ordered using GBHN order set	% Ordered not using GBHN order set	Relative increase in ordering using GBHN order set
Laboratory			
Magnesium level	92%	21%	3.4
Calcium level	92%	21%	3.4
Culture blood x 2 from peripheral and central line	92%	21%	3.4
Urine R&M	92%	21%	3.4
Urine Culture	85%	36%	1.4
CBC w/Diff, Lytes, CR Daily until neutrophil count >1	85%	21%	3.1
Medications			
Antibiotic First dose stat after cultures	77%	21%	2.7
Document low vs high risk	46%	0%	46*
Low – cipro and amoxicillin/moxifloxacin	0%	7%	(1.0)
High – ceftazidime, cipro and vancomycin	92%	50%	0.8
Filgrastim	46%	29%	0.6
*Absolute increase shown due to zero usage with no GBHN order set			

4.4.7 Fractured Hip

This order set is used often in Owen Sound but hardly ever at the rural sites. However it was seen that handwritten orders at the rural sites mimicked the order set, so it is thought that the transfer orders from Owen Sound that come from the order set are transcribed by the nurse as orders at the rural sites, often as a phone order. Much time and energy would be saved if the order set were used rather than copying out all those orders by hand. Regardless, it is seen that use of the order set does improve quality of orders.

Order	% Ordered using GBHN order set	% Ordered not using GBHN order set	Relative increase in ordering using GBHN order set
Pre-op			
PTT	88%	69%	0.3
INR	93%	81%	0.2
MRSA/VRE screening	100%	69%	0.6
Group and Screen	100%	75%	0.3
ECG on admission	100%	75%	0.3
CXR	100%	69%	0.6
Acute Pain Service	7%	6%	0.2
Morphine	78%	75%	0.0
Hydromorphone	5%	6%	(0.2)
Post-op			
Skin Assessment	93%	69%	0.4
Pressure Dressing	95%	69%	0.4
Cefalozin x 24h	93%	69%	0.4
Clindamycin x 24h	5%	6%	(0.2)
Vancomycin x 24h	2%	0%	2*
Acute Pain Service	54%	44%	0.2
Hydromorphone	2%	0%	2*
Morphine	54%	56%	0.0
*Absolute increase shown due to zero usage with no GBHN order set			

4.4.8 Stroke

There are a lot of guidelines and evidence around stroke care that have been incorporated into the Stroke Order Sets (both Thrombolytic Stroke and Non-Thrombolytic Stroke order sets were audited). Below it can be seen that there is a large increase in the quality of stroke admission orders when an order set is used versus handwriting the orders, or using other versions of orders. It was seen that many of the medications were not ordered as often as is intended using the order set, this may be a formatting issue that the Program will work with the Stroke Development Team on.

Order	% Ordered using GBHN order set	% Ordered not using GBHN order set	Relative increase in ordering using GBHN order set
Assessment Tools Ordered			
CNS	93%	10%	8.3
Rankin Scale	93%	3%	29.7
Laboratory Orders			
PT/PTT	98%	13%	6.5
Lipid Profile	98%	20%	3.9
Fasting Glucose	98%	19%	4.2
Diagnostic Imaging			
CT/MRI within 24 hours	78%	50%	0.6

Order	% Ordered using GBHN order set	% Ordered not using GBHN order set	Relative increase in ordering using GBHN order set
24h Holter Monitor	11%	3%	2.7
Doppler US to R/O DVT	11%	1%	10.0
Carotid Doppler 24-48h post stroke	33%	20%	0.7
Echo 24-48h post stroke	31%	23%	0.4
Medications			
Plavix	20%	18%	1.1
Dipyridamole	4%	1%	3.0
ASA	42%	44%	(0.1)
Ace Inhibitor	24%	31%	(0.2)
Referral to Rehab	18%	0%	18*
*Absolute increase shown due to zero usage with no GBHN order set			

4.4.9 Total Hip Replacement

The THR order set has been in place for many years, and there were not many adjustments to it when the GBHN Order Set Project was initiated. This order set is used very frequently in Owen Sound, but much less often at the rural hospital sites. Few indicators were audited at this time, as many indicators have long achieved full success over the years. This data does indicate a possibility of removing some orders from the order set, as they have low usage.

Order	% Ordered using GBHN order set	% Ordered not using GBHN order set	Relative increase in ordering using GBHN order set
Cefalozin x 24 hrs	97%	89%	0.1
Clindamycin x 24 hrs	0%	11%	(1.0)
Vamcomycin x 24 hrs	0%	0%	0.0
PCA per anaesthesia	86%	89%	0.0

4.4.10   Vaginal Birth

Similar to CS, order set usage in this diagnosis has a large uptake, however usage of the approved GBHN Order Set is low. Many of the sites are using older version of the order set, as was found during the audit. This data captures GBHN Order set usage, and the second column will include both handwritten orders as well as the non-approved older versions of order sets. This highlights the need for departments and programs to ensure the most recent version of an order set is used by staff. The data does show one instance of an order (Acetaminophen with codeine) that perhaps needs revision, as ordering went down with usage of the order set.

Order	% Ordered using GBHN order set	% Ordered not using GBHN order set	Relative increase in ordering using GBHN order set
Patient Care			
Group B Strep Documented	67%	58%	0.2
Discharge IV when fundus firm, lochia moderate and ambulating	83%	29%	1.9
Medications			
Zinc Sulfate	81%	33%	1.5
Docusate Sodium	90%	64%	0.4
Magnesium Hydroxide/Mineral Oil	78%	32%	1.4
Acetaminophen	95%	95%	0%
Ibuprofen	78%	45%	33%
Acetaminophen with codeine	65%	78%	(0.1)
Naproxen Sodium	48%	31%	0.6