

Standardized Network Order Sets in Rural Ontario: A Follow-Up Report on Successes and Sustainability

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Abstract

Unifying, implementing and sustaining a large order set project requires strategic placement of key organizational professionals to provide ongoing user education, communication and support. This article will outline the successful strategies implemented by the Grey Bruce Health Network, evidence-based care program to reduce length of stay, increase patient satisfaction and increase the use of best practices resulting in quality outcomes, safer practice and better allocation of resources by using standardized Order Sets within a network of 11 hospital sites.

Audits conducted in 2007 and again in 2008 revealed a reduced length of stay of 0.96 in-patient days when order sets were used on admission and readmission for the same or a related diagnosis within one month decreased from 5.5% without order sets to 3.5% with order sets.

The Grey Bruce Health Network (GBHN) is a network of five corporations: Grey Bruce Health Services (six hospitals), Hanover and District Hospital (one hospital), South Bruce Grey Health Centre (four hospitals), Grey Bruce Health Unit and the South West Community Care Access Centre (CCAC), which provides home healthcare for the region. These corporations began working together to implement seven deliverables as a network.

One of these deliverables was to develop a common process for

assessing the quality of services provided by the hospital corporations. The initial process determined by the network for internal coordination of care, was the development and use of clinical pathways. The network proposed to develop regional clinical pathways and guidelines for care that would span all 11 hospitals. It was intended that these pathways would improve communication within and across the hospitals; improve efficiencies, both clinical and financial; and improve access to best practices in the network resulting in quality outcomes. As a result of this deliverable, the evidence-based care (EBC) program was created to develop, implement and evaluate evidence-based clinical pathways, physician order sets and other evidence-based tools.

In 2007, as a preliminary step in developing this process, the GBHN formed a partnership with a company called Open Source Order Sets (OSOS) to deliver standardized order sets to our multi-hospital network in rural Ontario. This partnering was the beginning of a very successful project. OSOS is the only Canadian company to provide this unique expertise and offers the flexibility and diversity required to compete, not only with the demands of rural healthcare, but with the varying opinions and expertise of a large physician group. The simplicity of the order set design and clear content outline offers ease of use to the end users, thereby promoting user satisfaction. With this satisfaction comes useful feedback, improvement in content and design, increased compliance and the “new” becomes the “norm.” In light of the fact that the order sets offer such diver-

sity, the variations in physician groups and practices have come to realize an element of cohesion over a vast geographic area. This allows for consistent, safer, timelier and more efficient care for all patients across the entire region. This also results in better allocation of resources and a reduction of service duplication. This further translates into financial savings for the GBHN, one of the biggest challenges facing healthcare facilities today.

The article *Adaptation and Implementation of Standardized Order Sets in a Network of Multi-hospital Corporations in Rural Ontario* (Meleskie and Eby 2008) outlined the initial methodology, implementation, outcomes and challenges faced in achieving the successful project of developing a large number of order sets over a short period of time. This article will provide a comparison of the results of two audits designed to measure the adoption and impact of standardized order sets on utilization, quality and safety of patient care. It will also outline and expand on Meleskies' approach by sharing ongoing challenges, discuss different strategies used (both by program and participants) and includes successes in maximizing education and communication.

The order set project improves utilization, resulting in cost reduction, and provides the opportunity to better allocate resources as well as improving quality of care and patient safety.

Audit Results

In the spring of 2008 a small audit was conducted using a random sampling method to measure the overall compliance of usage across the network. One year later, in the spring of 2009 a much larger audit was conducted to gain more concrete data in measuring the adoption, impact and outcomes in the quality of patient care and resulting financial benefits. This larger audit reviewed 1,847 charts from all 11 hospital sites, including total populations for most of the 10 highest volume case mix groups (CMGs). To ensure statistical reliability, a minimum of 30 charts per diagnosis per site (or less depending upon the total admission numbers for that diagnosis) were reviewed over a one year time frame from February 2008 to February 2009. The data obtained covered the full range of performance indicators and their implications on the healthcare system and comparisons could be made between the two sets of data derived from both audits to measure

TABLE 1
Decrease in LOS with order set usage

Corporation	Average Actual Decrease in LOS with Order Set Usage	Current Usage	If Usage Reaches 80% Benchmark
		Potential Days Saved	Potential Days Saved
GBHS	1.17	512	1,007
HDH	0.32	8.6	111
SBGHC	2.44	312	808

GBHS = Grey Bruce Health Service; HDH = Hanover and District Hospital; LOS = length of stay; SBGHC = South Bruce Grey Health Centre.

sustained compliance and thereby, project success. A detailed report of the 2009 audit can be found by accessing the Evidence Based Care Program website at www.gbhn.ca.

The audit demonstrated that the order set project provides many benefits to the healthcare system. It improves utilization, thereby resulting in cost reduction, and provides the opportunity to better allocate resources as well as improving quality of care and patient safety.

Order Set Usage

Usage of the GBHN order sets audited averaged 36% across all sites in the network, as compared to 35% in the 2007 audit. This was extremely variable across the sites with a range of 9–63%.

The audit also noted order sets that were used for a diagnosis, but were not GBHN order sets. 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 11–82% 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 placed on implementing order sets. As a result, there was not an expectation that there would be an increase in usage over the second audit time span. Utilization management data in the audit demonstrated improved utilization of resources when order sets were used.

Length of Stay

Usage of GBHN order sets in the audit was associated with a statistically significant decreased length of stay ($p < .05$, controlled for age, sex, resource intensity weights [RIW] and resource intensity level [RIL]). Average length of stay (LOS) for charts that utilized GBHN order sets was 4.88, versus 5.84

for no GBHN order set usage. This definition includes both corporate (non-GBHN approved) and handwritten orders.

Looking at all order sets (GBHN approved and non-approved) compared to handwritten orders, the difference in length of stay is also statistically significant ($p < .05$, controlled for age, sex, RIW and RIL) – 6.92 versus 4.52 (Table 1).

Readmission Rates

The rate of readmission for an unrelated diagnosis within one week was reduced from 4.8% with non order set groups to 2.5% in those who received the benefits of order set use. The rate of readmission for the same or a related diagnosis within one month decreased from 5.5% without order sets to 3.5% with order sets.

In addition to examining utilization management data, the audit looked at quality of care in orders, comparing order set usage on admission to non-order set use. The intent was to find out if utilizing order sets resulted in better quality care, such as more comprehensive orders, better adherence to policies and procedures, improved patient flow and best practice usage. Comprehensive orders on admission should improve efficiencies by saving physician and nursing time since orders do not have to be added later. Patient satisfaction should improve as orders, and hence care, are timelier. Finally, LOS and patient outcomes are improved as orders are processed faster and are completed in a timely manner.

General Orders

The use of order sets resulted in a definite improvement in general order use, such as height, weight, diet and activity orders (Table 2).

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

Protocol Usage

Through the order set project a number of new protocols (e.g., bowel care protocol; hypoglycemic protocol; deep vein thrombosis protocol) were created to aid in flow of patient care. These protocols were used often when order sets were used, but much less often in the non-order set group.

Convenience Orders

Convenience orders are orders for common medications used on an as-needed basis. Convenience orders built into GBHN

TABLE 2.
Improvement in general order use with order sets

Order	% Ordered Using GBHN Order Set	% Ordered Not Using GBHN Order Set	% Increase in Ordering Using GBHN Order Set
Height and weight on admission	62	30	32
Diet	97	85	12
Activity	95	68	27

GBHN = Grey Bruce Health Network

order sets, where appropriate, were more often ordered using an order set than when orders were handwritten. This improves efficiency by reducing physician and nursing time required to get these “as needed” orders later, as well as improving patient outcomes and satisfaction by eliminating delays in receiving these medications.

Order Set-Specific Indicators

For each of the 10 CMG order sets audited, a subset of indicators specific to the diagnosis and based on best practice or external/internal indicators were looked at. It was seen fairly consistently that most of these indicators improved with order set usage, indicating more comprehensive and higher quality care. More detailed information regarding specific indicators according to diagnosis can be found within the complete audit paper (www.gbhn.ca).

Compliance with the Institute for Safe Medical Practices Canada

The Institute for Safe Medical Practices (ISMP) Canada publishes guidelines for writing physician orders that will reduce patient risk and improve quality of patient care. The auditors picked 20 random charts and did an ad hoc audit of ISMP compliance. The results clearly show an improvement with order set usage (Table 3).

Challenges

In introducing any new idea, there are both anticipated and unanticipated challenges. Identification of these challenges early on and the development of mitigating strategies are essential elements of success. Some of the unanticipated challenges in rolling out and subsequently sustaining a successful order set project are outlined below.

1. The amount of broad discussion, debate and interdisciplinary

TABLE 3.
Improvement in ISMP compliance with order set usage

Measure	% Ordered Using GBHN Order Set	% Ordered Not Using GBHN Order Set	% Increase In Ordering Using GBHN Order Set
All orders compliant with ISMP guidelines	100	0	100
Use of Tall Man lettering	60	0	60
No error-prone abbreviations or symbols	67	0	67
Use of complete drug name	80	0	80
Generic drug names for single-agent medications	67	0	67
Correct unit of measure	67	33	34
Correct placement of zero	73	33	40
Correct use of comma for dosing units	60	0	60
Correct use of terminal period	47	33	14
One space between dose and unit of measure	60	0	60
Correct order syntax	67	50	17
Complete order	73	50	23
Symbols absent from order	73	17	56
Calculated ordered dose as well as range	67	0	67
IV orders dose/min or dose/h	47	0	47
Measure	Using GBHN Order Set	Not Using GBHN Order Set	Improvement Using GBHN Order Set
Legibility: easy to read (average 1–10)	8.33	4.0	4.33
Legibility: clear in meaning (average 1–10)	10	5	5

GBHN = Grey Bruce Health Network; ISMP = Institute for Safe Medical Practices; IV = intravenous.

approval regarding content.

2. The challenges to provide clear and unequivocal “evidence” versus “expert-based” guidelines for the physician groups regarding content (based on true best practices).
3. Challenges in providing flexibility of content to allow for vastness of geography and how that relates to timely best practice. (Grey and Bruce counties cover 3,400 square miles and serve a population of approximately 150,000 people). For example the time to percutaneous coronary intervention for ST-elevated myocardial infarction (STEMI) from “door to balloon,” is extremely difficult to achieve due to distance in travel.
4. Establishing an effective communication and education strategy for ongoing implementation and change.

Overcoming Challenges

The first and second challenges that were initially identified by Meleskie and Eby (2009) continue to be ongoing. That is the amount of discussion required among the various physician and allied health groups to reach a consensus toward finalizing content on the individual order sets. Where there are clear, published level 1 guidelines indicating best practice, the debate is short. It is for those diagnoses, procedures and treatments where clear guidelines or research are not yet established and the reliance instead is on “expert-based” care as the rule, that the discussions become longer and more challenging. For this group of diagnoses, many factors must be taken into consideration including the availability of research, resources, the age and diversity of the population and the individual practitioner practice. Debate extends over a range of topics from who is considered to be the expert, to the references on available research. This is a monumental debate. Although the EBC program has critiqued and streamlined this debate through the experience and knowledge of the various physicians, it has generally determined the final product by reinforcing the “tool”

aspect of the order sets. That is, teaching is centred on the fact that while the physician group regards the order set as the guide toward best practice and most commonly applied practice, the order set itself must be individualized for each patient. In this way individualized order sets can be initiated on admission to suit the patients multiple co morbidities, as well as the individual physician's practice and preference. The misconception of "cookie cutter medicine" no longer applies as each "tool" is matched to the patient and the physician it serves, while still maintaining a standardized format. Best practices are adhered to in the form of pre-selected tick boxes so the physician has a clear understanding of what the guidelines recommend for that particular patient population. A variation from these recommended guidelines becomes a conscious effort to individualize the order sets to the patient condition and circumstances. A lesson well learned is to spend less time on the content debate and increase education on the use of the order sets themselves. For that order set content that the physician deems inappropriate for that particular patient, it is simply stroked off. In other words, if it doesn't apply, don't order it. This concept is no different than handwritten orders.

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The third challenge is in the vastness of the GBHN's geography. This has played a significant role in decision-making and in order set content. In certain established best-practice guidelines (whereby actual timeframes need to be adhered to), there is always the challenge of patient transfer, distance and the mode of available transportation, to factor in. For example, the guidelines for STEMI published in 2008 by the ACC/AHA Performance Measures indicate that there should be no more than 90 minutes from "door to balloon." In a rural setting, this is not always realistically achieved. Therefore, in collaboration with our supporting cardiac centers, a modification attempt is being achieved through pharmaco-invasive intervention awaiting transfer, or "treat and transfer." This involves modifying the guidelines to better suit the entire range of circumstances.

Historically, geography and associated transport delays are major players in the delay of care to those patients requiring more specialized services. Now the order sets, which have been developed and approved by our regional experts, (using best practice information), can be initiated, depending upon sending facility resources, while the patient awaits a consult or

even admission at a higher level facility. Thus when the patient does arrive, some (if not all) of the workup tests are completed and the specialist is better able to make a more expedient plan of action and final diagnosis. At times, enough of the workup has been completed that the consultation with the specialist can be completed in the emergency room or ambulatory care and the patient is returned to the sending facility with recommendations for further care. This results in a better allocation of resources, reduction of duplication, more appropriate bed utilization, increased patient satisfaction and reduced cost by having the patient in the right place at the right time. Thus the order sets have made the planning of care and resources much more cohesive and integrated.

The GBHN's EBC program has established an effective process toward the development and implementation of order sets, and a solid methodology for change requests. However the fourth, and probably the biggest, challenge to overcome to date is the ongoing need and scope of communicating these changes. Educating new physicians and front-line staff who are unfamiliar with order set usage and pathways of care can be overwhelming; there is a large learning curve, the details of which cannot be understood over a short orientation period. It is through peer-mentoring strategies that the full scope of the benefits of order sets are communicated to physicians, front-line staff and patients through the organizations. Thus the EBC program has invoked a multi-system approach toward communication. Strategic placement of order set champions is the single biggest and most successful approach to increasing understanding and usage. Nurse clinician involvement is paramount in communicating and understanding the needs of the various departments, as well as front-line staff to identify workflow issues. Real-time hands-on training for the physicians by the front-line staff and vice versa have resulted in a sustainable usage pattern as well as reduced the cost of ongoing training. All of the feedback, requests for content change and requests for new order set development are channelled through the EBC program coordinator in a structured manner. The order set committee, which is composed of members from all clinical disciplines, has the unique ability to review the submitted changes, implement the changes and update the various order sets. It is in this way that the program keeps the three hospital corporations (11 hospital sites) focused on the larger network collaboration. With increased usage, more requests for order set development have been forthcoming, most recently in specialty departments. With the increase in patient acuity and with their bed utilization at a maximum, the smaller hospital sites are realizing the benefits of having order sets for those infrequent diagnoses or treatments seen less often than the bigger centers. With the order sets, up-to-date best practice guidelines are embedded in these sets for guidelines of care, resulting in more prompt treatment and better outcomes.

To oversee these ongoing communication challenges, the EBC program has also invested resources in the hiring of an education/utilization coordinator. The education/utilization coordinator accomplishes their role through regular site visits, electronic and paper-based memos and monthly involvement in new employee orientation and is a member of key organizational committees. This role has proven invaluable when converting the paper-based order sets and pathways into the electronic Power Plans in preparation for computer physician order entry and furthering the electronic medical records.

Conclusions

The GBHN order set project continues to provide many benefits toward increasing efficiencies throughout the member organizations by reducing lengths of stay and streamlining resources, diagnostic tests and education. These benefits subsequently result in improved outcomes, cost reduction and the opportunity to better allocate resources. The initial audits suggest that use of standardized order sets improves utilization as well as improving quality and safety of care and patient satisfaction.

Although there was considerable site variance, overall, the order set usage improved from previous audit results and the compliance rates indicate shifting from the “new” to the “norm.” It is anticipated that since the audit was completed, and new education and communication strategies have been put effectively in place, that order set usage has improved dramatically. More recently there has been a surge in order set requests for development by the physicians and requests for change from front-line staff and clinicians.

Communication and education, however, remains the key to this successful project. Compliance and usage has increased with the use of not only site champions, but front-line user and clinician champions who offer this communication and education within their peer groups. Transforming user feedback into a friendlier workflow format has also contributed to satisfaction in the project.

Physicians, front-line staff and patients are all benefitting from the knowledge transfer experienced through the guidelines of order set implementation with embedded best practices and safety guidelines. Much less time is spent in content debate when the physician groups critique each of the “tools” to suit the needs of their individual patients and begin to understand the advantages to both their practices and their patients in the standardized content.

The geographic challenges encountered in rural healthcare and the ongoing subsequent challenges in adherence to timely best-practice guidelines, has been improved through the collaboration of partners within our own network and in co-operation and partnership with those centers outside our catchment area that offer more specialized care. Slight variations from practice guidelines have been well accepted and understood by the

diverse network groups.

The GBHN and the EBC program continue their successes in using standardized order sets developed using the OSOS platform within a framework of collaboration in Grey and Bruce counties resulting in increased usage and compliance, more adherences to safety and best practice, better patient outcomes and financial savings.

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