CANADIAN NURSES ASSOCIATION

INTEGRATION OF THE C-HOBIC DATASET INTO DISCHARGE ABSTRACT DATABASE (DAD) SPECIAL PROJECT FIELDS DEMONSTRATION PROJECT

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1.0 BACKGROUND

The Canadian Health Outcomes for Better Information and Care (C-HOBIC) is sponsored and managed by the Canadian Nurses Association (CNA). C-HOBIC introduces a systematic, structured language to patient assessment and documentation in acute care, complex continuing care, long-term care and home care. C-HOBIC uses the methodology developed in Ontario through the HOBIC program. The C-HOBIC dataset consists of data about the following categories of evidence-based clinical outcomes:

- Functional status and continence
- Symptoms – pain, nausea, fatigue, dyspnea
- Safety outcomes – falls, pressure ulcers
- Therapeutic self-care (readiness for discharge)

The clinical outcomes have a concept definition, a valid and reliable measure, and empirical evidence linking them to nursing inputs or interventions. The C-HOBIC Data Set has been mapped to International Classification for Nursing Practice (ICNP) and SNOMED CT to support inclusion in Electronic Health Records (EHR). The C-HOBIC data set was designated as a Canada Approved Standard (CAS) on January 11, 2012 and endorsed by both CNA and Canadian Nursing Informatics Association (CNIA) as "a standardized approach to nursing documentation in all clinical practice settings across Canada"[1]

To date, three phases have been implemented (see Appendix A for Phase 1 and 2). This study focuses on Phase 3 that involved the integration of the C-HOBIC Dataset into the CIHI acute care Discharge Abstract Database (DAD) Special Project Fields (SPFs) with two demonstration project sites in two different provinces. Inclusion of C-HOBIC data in the DAD SPFs aims to provide standardized patient-centred clinical outcomes data from acute care to support aggregation and analysis of clinical outcomes, health system use and performance reporting for local, provincial and national analysis and use. All organizations participated on a voluntary basis and absorbed the costs/expenses associated with their participation in the demonstration project. The data that were submitted were unedited; therefore, no Health Information Management coders were involved.

The evaluation study aimed to elucidate and understand the process, resources and value of inclusion of the C-HOBIC dataset (a clinical dataset) in the DAD SPFs and future scalability.

2.0. QUALITATIVE METHODS

2.1. Research Questions

The following research questions guided the qualitative component of the study:

1. What are the experiences and perceptions of stakeholders associated with integrating C-HOBIC into the DAD SPFs?
2. What are the recommendations for scalability?

2.2. Overall Study Design

This study employed an exploratory qualitative design[1] with a content analysis approach.[2,3]

2.3. Demonstration Project Description

A demonstration implementation has been undertaken at two sites to provide the C-HOBIC team, CIHI and provincial partners with feedback on the feasibility, value and utility of including this dataset in the DAD SPFs. For this phase, unreserved special projects fields in the DAD are being used for the C-HOBIC Dataset (see Table 1). CIHI has enhanced the DAD production system to accommodate these data elements in the special project fields (SPFs) and provided the required supporting specifications to abstract software vendors who support DAD data collection at hospitals. The C-HOBIC dataset is assessed on admission (within 24 hours) and discharge (within 24-48 hours prior to discharge) in acute care.

Table 1 C-HOBIC Dataset

C-HOBIC concept	Measure
Functional Status & Continence (ADL& IADL)	
- Bathing	InterRAI AC
- Personal hygiene	InterRAI AC
- Walking	InterRAI AC
- Toilet transfer	InterRAI AC
- Toilet use	InterRAI AC
- Bed Mobility	InterRAI AC
- Dressing	InterRAI AC
- Eating	InterRAI AC
- Bladder Continence	InterRAI AC
Symptoms	
Pain - Frequency	InterRAI AC
Pain – Intensity	0-10 scale
Fatigue	InterRAI AC
Dyspnea	InterRAI AC
Nausea	InterRAI scale
Safety	
Falls	InterRAI AC
Pressure Ulcer	InterRAI AC
Therapeutic self-care	
Knowledge of current medications	Sidani & Doran tool
Knowledge about why you are taking current medications	Sidani & Doran tool
Ability to take medications as prescribed	Sidani & Doran tool
Recognition of changes in body (symptoms) related to health	Sidani & Doran tool
Carry out treatments to manage symptoms	Sidani & Doran tool
Ability to do everyday things like bathing, shopping	Sidani & Doran tool
Someone to call if help is needed	Sidani & Doran tool
Knowledge of whom to contact in case of a medical emergency	Sidani & Doran tool

2.4. Methods & Analytical Plan

A qualitative design was employed with content analysis of the data. Ethics approval was obtained from the Research Ethics Board (REB) at St. Michael's where the Principal Investigator is employed.

2.4.1. Recruitment of Study Participants and Data Collection Procedures

This study employed purposive sampling to recruit participants that took part in the demonstration projects. The research team drew from a sample of technical personnel (e.g., information technology, health information management) involved in this work at the two sites as well as the clinical documentation vendor and the abstracting software vendor. An introductory email was sent out to potential participants about the study. Those willing to participate were asked to email the assigned research personnel to receive more information. The research personnel obtained verbal informed consent

from the participants prior to the interview and arranged for a convenient time for the telephone interview to be conducted. Study participants were asked to provide demographic information (position, years in position) to describe the overall sample. Two semi-structured interview guides (one for vendors and technical stakeholders and one for nurse leader stakeholders) was developed from the literature and is included in Table 2.

Table 2 Interview Guides

Stakeholder	Interview Questions
Vendor/Technical Stakeholders	What was the process of including C-HOBIC dataset in DAD SPFs? What staff members were involved in including C-HOBIC dataset in DAD SPFs? What was the estimated staff time/cost to the organization (health facility or vendor) required for including C-HOBIC dataset in DAD SPFs? What were the barriers and facilitators to including C-HOBIC dataset in DAD SPFs? From your perspective is including C-HOBIC dataset in DAD SPFs scalable and portable for use at other organizations? What would it take to make including C-HOBIC dataset in DAD SPFs scalable and portable for use at other organizations?
Nursing Leader Stakeholders	Do you think clinical data should be included in the DAD? Do you access the DAD portal and are you aware what is in it? Would the addition of clinical data in the DAD change this? If so how? How are you helping your staff to retrieve and use the C-HOBIC data from either your own EHR or the DAD? How has staff used C-HOBIC data in their daily work or improvement efforts? What are the lessons learned from this feasibility project that you would share with other facilities? From your perspective is including C-HOBIC dataset in DAD scalable and portable for use at other organizations? What would it take to make including C-HOBIC dataset in DAD scalable and portable for use at other organizations?

2.4.2. Analytical Plan

Research personnel conducted and recorded the interview sessions, and the resulting recordings were transcribed to produce transcripts that were analyzed using content analyses.2,3 Content analyses were conducted with an inductive coding schema constructed and used to categorize the narrative text. This analytical process involves the researchers reviewing the transcripts line-by-line independently to identify sections of text that serve as codes; the researchers then met to determine the codes and categories through consensus; and the researchers then developed themes from the categorical data through consensus. As a final step, the Principal Investigator (LJ) reviewed all the transcripts and compared them to the emergent coding schema to ensure all relevant themes, categories, and codes had been captured. [2,3]

3.0 FINDINGS

3.1. Demographic Profile

Study participants were recruited from two sites with site one having six hospitals that began submitting C-HOBIC data to CIHI in DAD SPFs on April 1, 2017 and a second rural site that went live with the collection of C-HOBIC on April 1, 2016.

Overall, seven people participated in the interviews with 5 from site 1, one from site 2, and one from a national data registry. Five were females and two were males and included two vendors, data coordinator, interface systems analyst, nurse clinician and one who requested not to be identified. Table 3 provides more details on the demographics of the study population.

Table 3 Study Demographics

Participant	Sex	What type of facility/organization are you employed at?	What is your role at this organization?	How many years have you been working in your current position?
DAD01	F	Hospital	Data Coordinator	10 years plus
DAD02	F	Hospital	Interface Systems Analyst	10 years plus
DAD03	F	Hospital	Requested to be unidentifiable	2-5 years
DAD04	M	Vendor	Implementation and Technical Support Specialist	6-10 years
DAD05	M	Vendor	Senior Technical Analyst	6-10 years
DAD06	F	Hospital	Nurse Clinician	10 years plus
DAD07	F	National Data Repository		

3.2. Themes

Three key themes emerged from the narrative dataset, these include: 1) building the interface; 2) varying levels of participation by organizations in submitting data and demonstration project; and 3) differing views on scalability and moving forward.

3.2.1 Building the interface

This first theme captures how study participants described what was involved in building the interface to enable C-HOBIC data to be abstracted from the patient record and sent to CIHI as part of the DAD submission and challenges faced. All participants described that the implementation process took a long time to roll out (described as *"drawn out"* and *"dragged on"*) for much longer than originally anticipated. As the study participant from the national data registry stated, *"we ended up delaying for some time"*. Study participants described that leadership thought that it would take less time and had initially set aggressive timelines to *"flip the switch"* the timeline had to be extended over time.

Challenges experienced by some participants included fitting in the demonstration project amidst other priorities and workload, not getting the right specifications, and having to redirect the messages. Other participants described building the interface as seamless as it was already built into their system. The following narrative describes this theme:

> *"It's fairly seamless now that we're into the process of submitting it into CIHI. My coders do not see the information in our abstract whatsoever. Where the information comes into the fields that have been defined by CIHI and the C-HOBIC project. So it's sent to CIHI just in their submission file. So as far as the abstract in the live environment, we don't see anything at all. My coders do not have anything to do with having this information come across. There's no checking of the data by them. It gets sent in to CIHI, which of course then it goes out to them and they get their graph of data after it gets to CIHI. It's added into our submission file by our vendors. So it's kind of tacked on and brought in when we generate the submission to CIHI for acute inpatient data. So there was no extra work on our behalf to validate any data. We basically get what we get included and submitted it to CIHI. We had been doing C-HOBIC on the nursing units and whatnot and the information was submitted in another form. There were two interfaces that did have to be built, one on our admissions, discharges, and transfers side—our ADT data—and then my vendor had to build an interface to then receive this data which is then submitted finally to CIHI but just within the submission program. What my vendor did do though, in my test database, is he did build chapters for the admission C-HOBIC data, and a chapter for the discharge C-HOBIC data so I could actually visualize the fields, the values, and the data that we were receiving from our ADT side, and that they were testing."* (DAD001)

> *"Redirecting the messages. There were a couple of things we needed to do because [the abstracting software vendor] needed to be able to identify our x sites a little differently than what C-HOBIC was doing so we had to adapt that. It was pulling different identifiers in just because [the abstracting software vendor] needed them to be able to sort through from their side. It's a chain of events. We were actually pretty lucky because we were already sending live data to C-HOBIC through an existing interface. Basically, what I needed to do was just adapt to what we were already doing – employment to our [abstracting software vendor] system. Most of work was really done by [the abstracting software vendor] side."* (DAD002)

> *"But we never really got proper specifications to allow us to build the interface so we never actually completed the project. I think just the client was having trouble with resources to get going on their end to create the file on the sending side. Maybe 'cause they were doing it for free, they didn't get as high priority. The main thing was getting the resources on the file creation side to give us specifications because they design the file and then they send us the specs so that we can build it on our side to match it. Another barrier was just trying to get…since the data was coming from a different system… getting it to match up with the CIHI system. Make sure that the fields are the same… the key fields to match the records. I'm not sure how much more help C-HOBIC could have been… It's just trying to make the data compatible between the two systems so that the patients would match up"* (DAD004)

"This integration part was a little complicated or I would say was a little tough because if it had of been a fresh module then you don't really have to worry about breaking the existing interface but in this case, we have to integrate this with their existing interface." (DAD005)

"This information within C-HOBIC is not what we routinely capture within the DAD but it fits in very nicely with the information that we have in the DAD which basically captures information on the patient at the beginning of their hospital stay and at the end of the hospital stay. Hospitals provide what we call a routine core record to [organization] and we also have the ability within the record to capture optional information. In this particular case, we used what we would call special project fields to build in the information that was required from C-HOBIC which coincided with when the patient status at the beginning of hospitalization and patient status at the end of hospitalization." (DAD007)

3.2.2 Varying levels of participation by organizations in submitting data and demonstration project

The second theme reflected the varying levels of participation by organizations in submitting data and their involvement in implementation of the demonstration project. A range emerged from study participants around the submission of data to those who are submitting and those who are receiving the data, those who stopped submitting and those who never submitted. As one participant noted *"There are still some that are supposed to be added in but the ones that participated, they are all sending to CIHI now."* (DAD005). The study participant who shared that their organization had stopped gathering C-HOBIC data due to the redundancy and workload associated with double documentation of the C-HOBIC indicators in their EHR. Interestingly, this participant described how valuable having clinical data as part of the DAD SPFs was stating *"I believe that clinical data is important to include in the DAD [and] that the elements that constitute C-HOBIC are important to include within the DAD."* This theme is illustrated in the following quotes.

"We're sending the data in our live database. All of our sites have now submitted to CIHI. We were just using the one site in the beginning to send the files in to CIHI." (DAD001)

"I can tell you that we are presently not collecting the C-HOBIC data. The reason we stopped collecting it is that our documentation system was such that the elements in C-HOBIC were being—had to be collected and they were redundant. So we had to do double documentation [in the EHR] in order to have the unique C-HOBIC items identified. We found that to be not a value-add and therefore we have stopped the collection of C-HOBIC. It was the C-HOBIC elements were incorporated within the existing dataset. They were standalone, additional assessments that needed to be completed. So we were one, not using to inform our current patient care, and two, there was no utility on discharge to share the information because there was essentially nobody else to receive it. It was being completed to the point of admission and at the point of discharge. But there was no examination of what that meant in the middle." (DAD003)

"We got really close at one point and there was just one more field that we needed included. Then I never ended up getting a new file … but we were really close." (DAD004)

Overall each study participant described their unique role in the demonstration project working collaboratively with other team members which ranged from having no involvement; testing the data that was being sent from one database to another; serving as a translator between the two systems; deciding what fields should exist; setting up the data capture at the national registry; and determining whether the information interfaced appropriately to the abstracting software vendor database – as noted by the following narrative.

> *"I wasn't included right from the get-go. Once it got to the part of now starting to send test data through to make sure that the values and the areas that basically my vendor was able to receive the data and translate it appropriately. My role in the project was to test the data that they were sending from our ADT into my [abstracting software vendor's] test database."* (DAD001)

> *"My coders had no involvement in this project whatsoever and basically are still blind to the information that's in our abstract. They don't see anything, there are no changes to our abstract that they're working on presently."* (DAD001)

> *"I was in the middle of the conversation making sure things were going the way they should. As an interface analyst, mostly what we do is we just act like a translator between two systems."* (DAD002)

> *"I worked with the contact at the hospital in health records who I normally work with and then some of their analysts in their organization that are responsible for creating these export files. Then I joined a bunch of meetings with the people working with C-HOBIC directly. With the file creation sides deciding which fields should be in there and which fields don't have to be in there but not the actual real data just the names of the fields. I do that kind of stuff all the time with different types of data so as long as they can get the data on their end, we can definitely import it easily."* (DAD004)

> *"I did receive the specifications and the details about how the C-HOBIC is going to be coded or evaluated at [vendor]. So we did receive the HL7 messages from [hospital]. My role is to extract those messages and load them in [vendor] so that there is minimum input by nurses or coders that they have to go in and manually enter the information. When we receive the specifications, we get the field names and their mapping. From the technical perspective, we just make a mapping dictionary that will read which value belongs to which field then we create all the fields in [vendor], so when we get the data we just map that data from that location to the specific field in [vendor]."* (DAD005)

> *"Where I got involved is when they actually created the interface between our [EHR documentation] collection of the C-HOBIC data to the [the abstracting software vendor] database at CIHI and I would end up . . . doing some generic assessments so we could see whether the information interfaced appropriately to the [the abstracting software vendor] database. I had access to [EHR documentation software] but I don't have access to the [the abstracting software vendor] spreadsheet or data that's going to the CIHI database. So I was able to input an assessment [EHR documentation software and then it was another one of our*

health records people that was able to look at the [the abstracting software vendor] database and see whether the same assessment that I had performed in [EHR documentation software] was showing up in the [the abstracting software vendor] database and then making sure that it actually flowed to the actual CIHI database… or the DAD appropriately." (DAD006)

"Client Service Representatives are basically experts within, in this case DAD, who work with me to define the 23-24 data elements that we need to capture for C-HOBIC. This is how we should set up. This is the special project field we have. These are the kind of collection instructions that we have. So that was mainly the type of staff I had to work with internally. Because we already have readymade capabilities for receiving this data and what we're really clear about because this is a pilot or trial, there was nothing that we were going to do within our processing IT system to beyond what already existed so we didn't require the use of IT staff. There were vendors that were working with the pilot hospitals, I did get engaged in some conversations with them. Part of the excitement about C-HOBIC was that ensuring that the vendors that take care of packaging the information sent to [organization] were able to interface and that was actually the excitement to us because this is the direction that corporately [organization] is going to. It was precedent setting" (DAD007)

3.2.3 Differing views on scalability and moving forward

The third theme encompasses the differences of study participants' views on whether the demonstration project was scalable to other hospitals. For some, they felt it was scalable and others they did not. As one participant described developing the demonstration project from the start to be scalable to other hospitals and that they "*re-integrated that into their current system, we still kept the main structure outside of the DAD module so that we can just take that off and map it to any other site if we have to."* Another participant had a contrary view of not being scalable due to the customization of the system. This theme is elucidated with the following narrative excerpts.

"Yes it is [scalable]. The way we looked at it was for the [vendor] it was a pilot project so the way we developed it was thinking with that in mind that it would get rolled out to other sites in [the province] so we didn't want to re-invent the wheel. So even though we re-integrated that into their current system, we still kept the main structure outside of the DAD module so that we can just take that off and map it to any other site if we have to. I think in regards to the [hospital], they already had everything set up in their registrations system so they already had the HL7 interface going on so I can see this as an issue where the sites don't have the HL7 set up in place. So if they have the setup for HL7 then it would be relatively easy to implement… in terms of implementation but if they don't that is something that we're definitely going to struggle on from both ends, the site perspective and the [vendor] perspective." (DAD005)

"I would think so, yes [scalable]." (DAD006)

"Not really [scalable]. The reason being is [that EHR documentation software] systems are extremely customizable so just because we're using [a specific EHR documentation software] and say [another organization] is using [the same EHR documentation software] doesn't mean it's

the same beast at all. Because we customize so many things along the way, the DAD itself comes out of clinical documentation module, but that is all custom-built, so the chances of us custom-building the same as say [another organization] or whoever using the [same EHR documentation software] system is pretty slim. [As an EHR documentation software vendor], we would want to set a standard by [documentation]." (DAD002)

"It is scalable and portable. The one successful pilot has probably set a template on how to do this well. The value is that if they can replicate what was good and things to avoid would be very useful to any other organizations. We know organization have their own hospital information systems and a lot of them within hospitals make a lot of things very much unique but I think to make it scalable we need to have people involved that focus not on the uniqueness but on the commonalities of making this portable. Everyone involved is looking at the future so I think this model could be a good nearer midterm type of initiative to use it, get the information right away in the DAD. I think longer term this probably there's different models for getting at this information." (DAD007)

Study participants also provided different recommendations for future efforts in integrating C-HOBIC into the DAD. These included providing time for IT and vendors to work together who are committed to test the interface amidst competing projects; creating a interface with a well-integrated documentation system and artificial intelligence in extracting and abstracting data; and having the knowledge of the technical process and what *"pieces they're pulling out of the DAD and the assessment and what they're using that information for."* One study participant recommended that *"the licensing issue needs to be resolved"*. The following quotes describe this theme.

"Moving forward, if this is something that is going to be made mandatory for facilities that facilities are given the time to work with their IT and vendors to allow for testing process and interface builds on both ends. I don't know about everybody else's IT departments, but ours is very busy…there's other projects. Everybody has to be conscious of the time on our IT department as well, to be able to complete this work and have the time to focus on it. It should be managed so that there's timelines and deliverables. It would've been nice to be involved from the start and have some timelines set for the project to make sure both our IT department and our vendor were keeping it moving along. Your vendor and IT involvement you have to have a commitment from both of them moving forward." (DAD001)

"There needs to be some degree of some sort of artificial intelligence in extracting, abstracting work that coders do, so something ends up in the DAD. There needs to be an investment in establishing documentation systems and processes that are integrated and not in a discipline silos, and then allow a narrative to be extracted aside from the medical staff. Because the medical staff doesn't need to fill out separate forms, etc.—certainly they have to identify coding for most responsible diagnosis, etc. But their words are abstracted and they form the information that is in the DAD. I think that would be the magic bullet, if we had a well-integrated documentation system that was about the patient and not dependent on individual healthcare providers and their lens on the patient. We would be in a much better environment to improve outcomes for our patients. Patients appreciate it too. Because nothing drives them crazy more than having

healthcare professionals ask them the same questions over and over and over again." (DAD003)

"Interface template for having the source data to our data collection software. It was mostly just trying to get the specs locked down and if we were paying for it maybe it would have got done quicker." (DAD004)

"It probably would have been helpful for me to have a little bit more knowledge about the actual technical process more sort of as a high level "this is what happens" because if I as a nurse educator I don't know a lot about interfaces and that sort of thing but some course work that I've been doing on my own helped me with that. But I think for somebody that is just doing the assessments to make sure that the interface was working properly and involved in the process it would be helpful if they had a health informatics background for instance. I think the sharing of how they're using the C-HOBIC data. Ya know what they're looking… what pieces they're pulling out of the DAD and the assessment and what they're using that information for." (DAD006)

4.0 QUANTITATIVE METHODS

A descriptive design was employed to calculate the frequency of ‘no entry’ compared to a valid data/format for each of the C-HOBIC measures. Frequency was calculated in terms of number of occurrences (frequency count) and in a percentage format. Two coders separately coded the excel data spreadsheets and then compared results to prepare the final data tables.

5.0 QUANTITATIVE RESULTS

The final data tables are presented in Table 4 (Site 1) and Table 5 (Site 2).

Table 4 Site 1 C-HOBIC Measures

C-HOBIC Measure Site 1 (N=1918)	Admission			Discharge		
	Valid Data/ Format	No Entry	% Valid Data/ Format	Valid Data/ Format	No Entry	% Valid Data/ Format
Bathing	246	1672	13%	907	1011	47.3%
Personal Hygiene	1017	901	53%	959	959	50%
Walking	1017	901	53%	959	959	50%
Transfer Toilet	1017	901	53%	959	959	50%
Toilet Use	1017	901	53%	959	959	50%
Bed Mobility	1017	901	53%	959	959	50%
Eating	1017	901	53%	959	959	50%
Bladder Control	1017	901	53%	959	959	50%
Pain Symptoms	1017	901	53%	959	959	50%
Pain Intensity	1019	899	53.1%	959	959	50%
Fatigue	1019	899	53.1%	959	959	50%
Dyspnea	1019	899	53.1%	959	959	50%
Nausea	1017	901	53%	959	959	50%
Falls	1017	901	53%	959	959	50%
Pressure Ulcers	1017	901	53%	959	959	50%
What Medications	916	1002	47.8%	839	1079	43.8%
Why Medications	916	1002	47.8%	839	1079	43.8%
Medications Taken	916	1002	47.8%	839	1079	43.8%
Noticeable Symptoms	915	1003	47.7%	839	1079	43.8%
Manage Symptoms	915	1003	47.7%	839	1079	43.8%
Everyday Activities	915	1003	47.7%	839	1079	43.8%
Support Available	915	1003	47.7%	839	1079	43.8%
Emergency Contact	915	1003	47.7%	839	1079	43.8%

Table 5 Site 2 C-HOBIC Measures

C-HOBIC Measure Site 2 Rural (N=419)	Admission			Discharge		
	Valid Data/ Format	No Entry	% Valid Data/ Format	Valid Data/ Format	No Entry	% Valid Data/ Format
Bathing	112	307	26.7%	288	131	68.7%
Personal Hygiene	375	44	89.5%	308	111	73.5%
Walking	375	44	89.5%	308	111	73.5%
Transfer Toilet	375	44	89.5%	308	111	73.5%
Toilet Use	375	44	89.5%	308	111	73.5%
Bed Mobility	375	44	89.5%	308	111	73.5%
Eating	375	44	89.5%	308	111	73.5%
Bladder Control	375	44	89.5%	308	111	73.5%
Pain Symptoms	375	44	89.5%	308	111	73.5%
Intensity Pain	375	44	89.5%	308	111	73.5%
Fatigue	375	44	89.5%	308	111	73.5%
Dyspnea	375	44	89.5%	308	111	73.5%
Nausea	375	44	89.5%	308	111	73.5%
Falls	375	44	89.5%	308	111	73.5%
Pressure Ulcers	375	44	89.5%	308	111	73.5%
What Medications	342	77	81.6%	257	162	61.3%
Why Medications	342	77	81.6%	257	162	61.3%
Medications Taken	342	77	81.6%	257	162	61.3%
Noticeable Symptoms	342	77	81.6%	257	162	61.3%
Manage Symptoms	342	77	81.6%	257	162	61.3%
Everyday Activities	342	77	81.6%	257	162	61.3%
Support Available	342	77	81.6%	257	162	61.3%
Emergency Contact	342	77	81.6%	257	162	61.3%

The quantitative data analysis revealed the following trends for site specific and site comparison of the frequency of 'no entry' and a valid data/format for each of the C-HOBIC measures.

Site Specific

Site 1

- Bathing C-HOBIC measure increased from 13% on admission to 47.3% in discharge was slightly higher than the 8 C-HOBIC Therapeutic Self Care measures (43.8%) for % valid data/format on discharge
- Slight decrease of reported % valid data/format (range of 53 and 53.1% on admission to 50% on discharge) on the following C-HOBIC measures (personal hygiene, walking, transfer toilet, toilet use, bed mobility, eating, bladder control, pain symptoms, pain intensity, fatigue, dyspnea, nausea, falls, and pressure ulcers)
- Slight decrease of reported % valid data/format (range of 47.7% and 47.8% on admission to 43.8% on discharge) on the 8 C-HOBIC Therapeutic Self Care measures
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Site 2

- Bathing C-HOBIC measure increased from 26.7% on admission to 68.7% in discharge was slightly higher than the 8 C-HOBIC Therapeutic Self Care measures (61.3%) for % valid data/format on discharge
- Decrease of reported % valid data/format (89.5% on admission to 73.5% on discharge) on the following C-HOBIC measures (personal hygiene, walking, transfer toilet, toilet use, bed mobility, eating, bladder control, pain symptoms, pain intensity, fatigue, dyspnea, nausea, falls, and pressure ulcers)
- Decrease of reported % valid data/format (81.6% on admission to 61.3% on discharge) on the 8 C-HOBIC Therapeutic Self Care measures

Comparing Sites

- Site 2 (rural) has greater % valid data/format compared to Site 1 on all C-HOBIC measures on admission and discharge
- Bathing C-HOBIC measure on admission the lowest reported % valid data/format on admission (13% for Site 1 and 26.7% for Site 2)

Note: it appears that the majority of 'no entry' code occurrences appear across the individual encounter - meaning that if there is a no entry in one of the C-HOBIC measures for one encounter – there appears to be no entry for all measures for that one encounter

In addition to the C-HOBIC measures provided for the quantitative analysis, the following was also shared by one of the sites"

> *"We had some abstracting software vendor intervention as there were some issues with the anonymizing the data. Also had to go to the interface team as there were some blanks that showed on the report but the charts indicated they had been entered correctly."*

6.0 LIMITATIONS

As reported in the findings, all participants (sites, staff and vendors) were volunteers; as such C-HOBIC PHASE 3 was extra to workload and not prioritized among other corporate EHR initiatives and system upgrades. Thus, the duration of the project was prolonged and repeatedly delayed. In addition, one site eventually withdrew for operational reasons. Therefore, the qualitative findings must be viewed with the following limitations: transferability of findings to other settings may be challenging given there was a small sample size and one health-care organization withdrew. The voluntary nature of recruitment of the sites and vendors may also have introduced selection bias.

7.0. RECOMMENDATIONS FOR SCALABILITY

Moving forward, the narrative dataset yielded the following three key recommendations for scalability across Canadian healthcare organizations:

1. Integrate C-HOBIC data into the clinical documentation systems within healthcare organizations for successful sustainable implementation of C-HOBIC.
2. Implement strategies to increase the documentation of C-HOBIC data on admission and discharge in the clinical documentation systems within healthcare organizations.
3. Standardize clinical documentation including C-HOBIC data across organizations nationally to facilitate the extraction of data to the DAD SPFs.

Longer-term recommendations for scalability across Canadian healthcare organizations include the need to:

1. Adopt a nation-wide rollout approach of including C-HOBIC in the DAD SPFs similar to the ICD-10 rollout that includes adequate time for organizations by i) providing training and education session to their staff; ii) upgrading their clinical documentation systems; and iii) developing interfaces with their vendors to submit the data to the DAD.
2. Establish a national rollout of C-HOBIC in the DAD longitudinally (e.g.: 10 years).

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APPENDIX A: OVERVIEW OF HOBIC AND C-HOBIC IMPLEMENTATION PHASES

Phase 1 occurred from May 2007 to June 2009 funded by Canada Health Infoway and participating provincial partners: Saskatchewan Health, Manitoba e-health, Manitoba and the Ontario Ministry of Health and Long-term Care. In Ontario, C-HOBIC was implemented in acute, long-term care, complex continuing care and home care (funded by the Ontario Ministry of Health and Long-term Care), in Manitoba in long-term and home care, and in Saskatchewan in long-term care.

Phase 2 occurred from February 2012 to January 2015 funded by Canada Health Infoway and participating provincial partners: Manitoba e-health, Winnipeg Regional Health Authority, St. Boniface Hospital, Clinical Connect, and the Institute for Clinical Evaluative Sciences. In this phase the C-HOBIC assessment measures were built into admission and discharge assessment screens in Manitoba at St. Boniface Hospital. In addition, St. Boniface has created a summary (i.e. synoptic) report of the assessments that is part of the discharge package to support patients' transitions from acute care to other sectors of the health system. In Ontario as part of Phase 2 funding a graphic synoptic report of the C-HOBIC standardized clinical information is available on the ClinicalConnect portal to support patient transitions in the Hamilton Niagara Haldimand Brant and Waterloo Wellington Local Health Integration Networks (LHIN).

1.1 Benefits of C-HOBIC

1) Nurses and Healthcare Executives - Use of data to improve frontline health care programs and services
   - C-HOBIC introduces a standardized language to patient assessments and provides information to support clinical accountability and quality patient care
   - The collection of this standardized clinical information provides information to evaluate operational decisions and resource allocation
   - Standardized information for comparative analysis within organizations and industry benchmarking
   - The C-HOBIC dataset is easy to incorporate into new and existing clinical assessments and thereby provide real-time information to support clinical practice

2) Health System Researchers - Use of data for health research
   - Standardized clinical data within the CIHI Discharge Abstract Database (DAD) – SPFS to answer research questions about the impact of practice on clinical outcomes
   - Standardized clinical data within the DAD-SPFs to support research on new approaches to clinical practice

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