Let's Talk Informatics

Nova Scotia Health's Data Quality Framework

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Let's Talk Informatics

Nova Scotia Health's Data Quality Framework
Steven Carrigan Director of Analytics and Matthew Murphy, Chief Data Officer
January 26th, 2023

Acknowledgement

We acknowledge we are gathered today
in Mi'kma'ki (*Mig-*maw*-gee), the traditional ancestral
unceded territory of the Mi'kmaq (*Mig-**maw**) people.

Informatics

Informatics utilizes health information and health care technology to enable patients to receive best treatment and best outcome possible.

Let's Talk Informatics Objectives

This series is designed to enable participants to:

- Identify knowledge and skills healthcare providers need in order to use information now, and in the future.
- Prepare health care providers through an introduction to concepts and experiences in Informatics.
- Acquire knowledge to remain current by becoming familiar with new trends, terminology, studies, data and news.
- Collaborate with a network of colleagues to establishing connections with leaders who can provide advice on business issues, best-practice and knowledge sharing.

Conflict of Interest Declaration

I do not have an affiliation (financial or otherwise) with a pharmaceutical, medical device, health care informatics organization or other for-profit funder of this program.

Session Specific Objectives

- At the conclusion of this activity, you will be able to:

    - Session specific objective #1: Define NS Health's data quality framework
    - Session specific objective #2: Understand how to apply the framework to an area of care of information system
    - Session specific objective #3: Assess the utility of the Framework for a largescale change project

NSH Data Quality Framework

- Why have a framework?

- What are our principles?

Dimensions of Quality

5 Dimensions of Quality

Source: Canadian Institute for Health Information
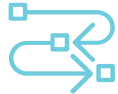
Dimensions of Quality

NS Health's Data Quality Metrics

Accuracy

Whether the information in existing applications (e.g., STAR) reflects the event and/or patient reality

Completeness

Whether the data in existing applications meet the expectations of C3-level of information comprehensiveness

Consistency

Whether data on the same event or patient in more than one application are consistent

Timeliness

Whether the data is available when needed to make decisions. This may be expressed in the currency or freshness of the data (dependent on workflow) and the volatility of the data (how long the data remains accurate as displayed)
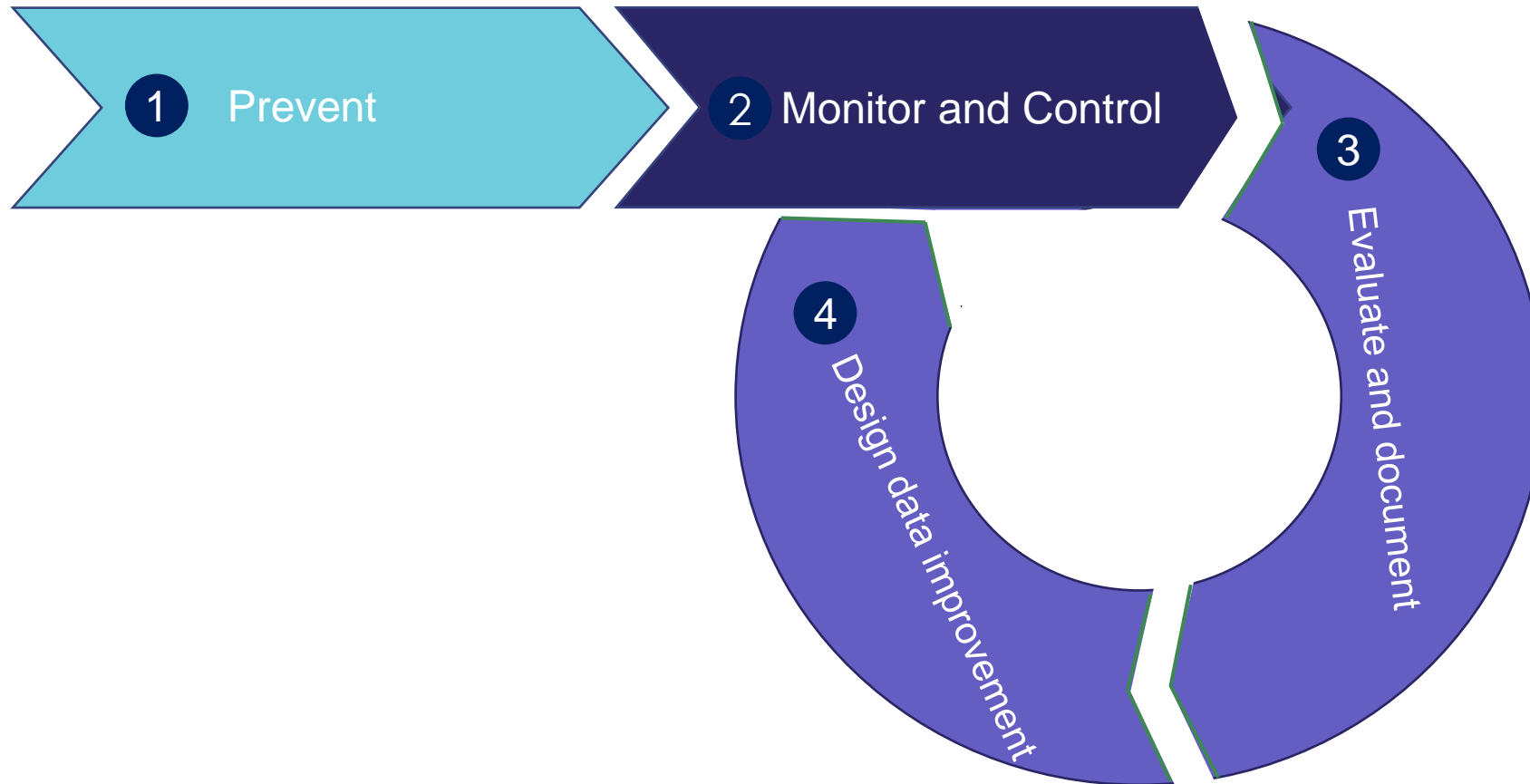
Uniqueness

Whether there are duplicates in the data. Each data record should be unique, otherwise the risk of accessing inconsistent outdated information increases

Validity

Whether the data conform to a specific format or follows business rules. A popular example is birthdays – many systems ask you to enter date of birth in a specific format, and if you don't, it's invalid

Source: NSH Analytic

Steps in the DQ Framework

1 Prevent

2 Monitor and Control

3 Evaluate and document

4 Design data improvement

Prevent

- Preventing quality issues before they occur is ideal, as fixing data after the fact is always more costly. Some components of NSH's preventive activities include

- Standards (technical, data and clinical) to ensure consistent data is captured;

- Vendor specifications to ensure that the data that is captured and submitted complies with standards;

- Training and client support to ensure that data providers capture data accurately and according to standards; and

- System edits/audits that validate data as it comes in and either prevent erroneous data from getting into databases or flag less serious issues

Monitor and Control

- As data is submitted and analyzed, monitoring and control activities come into effect. These include the following:
  - Error reports and corrections: NSH systems validate data as it comes in, and feedback is provided to suppliers of the data so that they can correct it if needed.
  - Issue management: Reports are provided to data stewards and providers that summarize basic quality issues identified by monitoring submission volumes and other consistency checks that flag unusual changes or outliers
  - Advanced surveillance methodologies based on machine learning and sophisticated statistical techniques flag anomalies that would not otherwise be detectable through routine monitoring and validation (future – some piloting underway)

Evaluate and Document

Once a data set or information product is considered final, different activities come into effect to evaluate and document overall quality. Some components of this include

- Producing documentation and metadata to provide information to data stewards and users regarding the production, interpretation and uses of the data;

- Assessing the quality of data sources;

- Evaluating indicators using the indicator life cycle;

- Conducting stakeholder consultations and evaluation surveys to seek input regarding the results, understand what quality means to them and whether the information is meeting their needs;

- Producing data and information quality metrics, indicators and reports; and

- Conducting targeted validation studies (such as re-abstraction studies) to evaluate specific aspects of quality.

Improve

- Using the data and information is one of the key ways to improve it:

- Users and providers grow to appreciate the value of the data; conducting analyses makes it easier to spot suspicious data; and people pay more attention to the data when decisions are made with it.

- Improvement of data and information occurs iteratively over the course of conducting quality activities

CIHI Data Quality Report

The **indicator ratings** are assigned according to the ranges shown in the table below:

Indicator Name	Green Zone	Yellow Zone	Red Zone
Accuracy and reliability			
Completeness of Participation: Records	>95%	50-95%	<50%
Outstanding Hard Error Rate/Rejected Record Rate	<10 per 10,000	10-20 per 10,000	>20 per 10,000
Availability of Data for Calculation of Day Surgery Length of Stay	>95%	90-95%	<90%
Comparability and Coherence			
Availability of Health Care Number for Linkage	>98%	95-98%	<95%
Availability of Postal Code for Linkage	>97%	94-97%	<94%
Timeliness and Punctuality			
Availability of Data by Future Target Closure Date of May 31	>95%	80-95%	<80%
Availability of Data Within 60 Days After Quarter End	Not assigned	Not assigned	Not assigned
Availability of Data within 3 Months of Discharge	>75%	25-75%	<25%

Health Standard Mortality Ratio (HSMR)

- Key Performance Indicator for NSH

- Highly susceptible to data quality

- Significant impact on public perception of healthcare system

Year Type	Fiscal Year	Cape Breton Healthcare Complex
Closed Year	2017/18	164
	2018/19	138
	2019/20	150
	2020/21	123
	2021/22	119

Top causes of death
in Canadian hospitals
(excluding COVID-19 deaths)

Stroke
Heart failure
COPD
Pneumonia
Respiratory failure
Sepsis

(Source: CIHI, 2020)

C3 Case Study

CONTEXT

WHY

- The C3 application uses data and analytics to **improve decision-making**
- Reliable, high-quality data is essential to **realize C3 benefits**
  - Data in C3 tiles reflect data quality in source systems (e.g., STARS, EDIS)
- Clinical and operational activities have an impact on data quality requiring **coordination with the CI WG**

WHAT

- Improve source system data quality
- Align on what to target:
  - Data elements
  - Data quality dimensions
  - Degree of improvement

Discussion 2: Define data quality's target state
Data Quality Metrics

Accuracy

Information in existing applications (e.g., STAR) reflects the event and/or patient reality
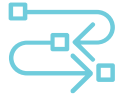
Completeness

Data in existing applications meet the expectations of C3-level of information comprehensiveness

Consistency

Data for the same event or patient in more than one application are consistent

Timeliness

Data is available when needed to make decisions. This may be expressed in the currency or freshness of the data (dependent on workflow) and the volatility of the data (how long the data remains accurate as displayed)

Uniqueness

Whether we have duplicate records occupying the same time (e.g., event is recorded more than once for the same patients) within or across systems.
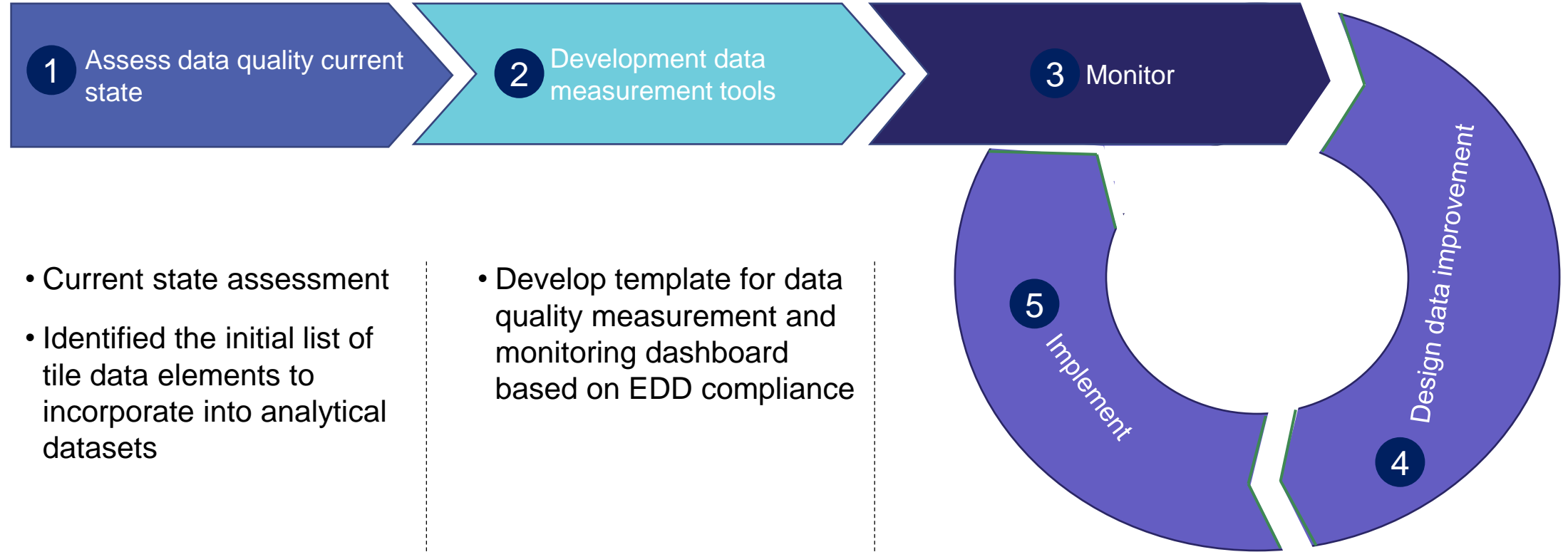
Validity

Information follows workflows

METHODOLOGY

The 5-step Data Quality Improvement Framework to be developed for key C3 data elements

1 Assess data quality current state

2 Development data measurement tools

3 Monitor

Design data improvement

5 Implement

4

To-date Activities

- Current state assessment
- Identified the initial list of tile data elements to incorporate into analytical datasets

- Develop template for data quality measurement and monitoring dashboard based on EDD compliance

Next Step/ Ask

- **Finalize dataset development with IM/IT BI team**

- **Prioritize and develop data quality dashboard views / Align with data quality profile opportunities in tiles**

- **Create roadmap to monitor and improve data quality**

Source: NSH Analytics

Consistency Walk-Through
How input data quality affect operations

Context: Looking at 3 scenarios:

      (1) Admit to inpatient

      (2) Admit to operation/surgery room

      (3) Discharge from hospital

Assessment: Found the following 3 potential issues with consistency, of note these are reflective of historical workflows and expectations for documentation, process improvements are already underway to address some of these issues:

Discrepancy	Method	Result	C3 implication
1. Admission as inpatient and discharge	**Compare** timestamp for **Patient Admit in STAR** and **ER Discharge in EDIS**	Adm Unit Cd — Abs Diff (group) QEI 5 mins or less — 18.09% 6 - 29 — 46.54% 30 - 59 — 16.68% 60 -120 — 9.11% More than 2 hours — 9.58%	20% of the inpatients do not show up on CE tile 1 hour or more later.
2. Surgical patient location	**Compare** location between **ASM Surgery Time** and **Patient Admit/Transfer in STAR**		Inaccuracy/delay in receiving data on ED and OR availability / occupancy
3. ED discharge and when they leave the site	**Compare** timestamp for **ER Discharge in EDIS** and **EHS transfer pickup**	Discharge Compared to EHS Pickup Discharged more than 10 mins after leaving site — 22.21% Discharged within 10 mins of leaving +/- — 61.02% Discharged more than 10 mins before leaving site — 16.77%	Inaccuracy/delay in ED availability / occupancy

Data Elements - Completeness

- 21 prioritized data elements for CE Tile:

Core data elements	Intent to discharge	Request to transfer	Waitlist
Admit Datetime	Intent to Discharge (datetime)	Expected Transfer Date	Expected Transfer Date
Transfer Datetime		Expected Transfer Time	Expected Transfer Time
Transfer – Actual Unit		Transfer Date	Transfer Date
Transfer – Room		Transfer Status	Waitlist Status
Transfer – Bed		Destination Facility	
Discharge Datetime		Destination Unit	
First Estimated Date of Discharge (EDD)		Transfer Reason	
Current Estimated Date of Discharge (EDD)		Destination Bed	
ALC Flag			
Declassed Flag			

Thank you

Need More Info?

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- **Digital Health Canada** - participants can claim 1CE hour for each presentation attended.

- **College of Family Physicians of Canada and Nova Scotia Chapter** - participants can earn one Mainpro+ credit by providing proof of content aimed at improving computer skills applied to learning and access to information.

- **Canadian College of Health Information Management** - approves 1 CPE credit per hour for this series for professional members of Canada's Health Information Management Association (CHIMA).