



HARC REPORT

Optimising online reporting of health performance data for heterogeneous audiences

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A report summarising a HARC study tour, June 2015

Bureau of Health Information

Optimising online reporting of health performance data for heterogeneous audiences

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Contents

Executive Summary.....	1
Introduction	5
The Bureau of Health Information.....	5
Background to the project.....	5
Methods.....	7
Findings.....	8
Literature review	8
Interview findings.....	12
Relevance.....	12
Clarity	16
Appropriateness to stakeholders.....	20
Sustainability	23
References.....	25

Executive Summary

The following presents a synthesis of the findings of a number of international visits and interviews in June 2015, supported by a literature review. The objective of the evaluation was to better understand how to optimise the online delivery of healthcare performance data in a relevant and clear style that encourages uptake by stakeholders, while operating in a manner that is sustainable to implement and manage. This report presents the findings of this review sorted by the four components of this objective: relevance; clarity; appropriateness; and sustainability.

This report focuses on the needs of two large groups of stakeholders: healthcare workers (those working in the management and delivery of healthcare) and consumers (the general public for whom the public healthcare system is intended).

A summary of findings is presented below. More detail can be found within the body of the report.

Relevance

- There is **great diversity** in approaches to developing online reporting sites and in the sites produced. As there is no one-size-fits-all model, the importance of partnering with end-users to ensure the sites are relevant to them is reinforced.
- Employing **multiple methods** of working with end-users in the evaluation and development of reporting sites is common and brings different perspectives to the process to ensure relevance to intended audiences.
- A **framework** that defines what is relevant to the reporting site's intentions will help guide stakeholders' feedback and how this is prioritised during development.
- What is relevant changes over time and the site should evolve to meet changing needs. **Continual online feedback** mechanisms are a common source of comments to ensure sites remain relevant, but are ideally augmented by other forms of assessment at appropriate intervals.
- Given the dynamic nature of the channel, online performance reporting sites have the potential to be under **perpetual development**, as a means to ensure that the content continues to be current and relevant to end-users. They are positioned to do so through use of techniques such as beta sites and real-time feedback, although resources need to be allocated that are appropriate to the planned extent and frequency of development.

Clarity

- The online channel offers **unique opportunities for user-testing** through possibilities such as remote user access, online forums, web polls and eye tracking.
- Only **essential information** should be presented as a default, with access to more detail as required by the end-user. This means ensuring minimal repetition between webpages and providing additional information through drill-down links or downloads.
- If transparency of performance data is an objective, **menus or lists** can assist the end-user select items of most interest to them, which keeps the site simple while offering all relevant data.
- Consideration should be given to **announcing the information available** on the landing page of the site.
- Comparison between providers and attributes is an area where the ability of end-users to interpret the data is seen as both particularly important and challenging. To improve clarity, a **limited number of providers and attributes should be displayed** at one time.
- **Tabular summaries** are generally well accepted and understood.
- To aid interpretation of data, there should be **consistency** in symbols, colours and metrics where possible and **explicit indications of whether values are favourable or not**.
- In addition to ensuring continuing relevance, **continual online feedback** mechanisms are simultaneously useful as a source of feedback to ensure sites remain clear to navigate and interpret.
- **User-testing** provides essential feedback on the ease of navigating and interpreting the site contents. The mechanisms for this can vary depending on the user group and stage of development.

Appropriateness to stakeholders

- Consumers and healthcare workers have **different requirements** for the site, and attention to both audiences' needs is required during all stages of development.
- Although important for all audiences, **interpretability** can be of particular relevance to consumers who may have less experience interpreting performance data, while **validity** can be a particularly strong focus for healthcare workers.
- A **'less is more' approach** should be taken, particularly for consumers, although for healthcare workers, a higher level of complexity and analyses is appropriate.
- Explicit displays that **rank providers' performance** are less common; however, this information is often desired (especially by consumers) and can be shown in an indirect way that is suitable for each audience (e.g. funnel plots for healthcare workers, top 10% and bottom 10% for consumers).

- For consumers, **symbols** and **descriptive text** are commonly used to assist them in interpreting the data. For healthcare workers, symbols can be a ‘turn-off’ unless linked to more detailed information and demonstrated to be based on valid statistical parameters, rather than arbitrary allocation.
- Healthcare workers desire data that is both rolled up to an **aggregate level** and broken down to **patient-level**.
- Ability to view results by **patient subgroup** is desirable to healthcare workers.
- Healthcare workers wish to **compare local data** to peers or benchmarks.
- **Provision of data files** behind the charts is seen as particularly useful to healthcare workers.
- Added functionality such as **automatic alerts** could increase the utility of the data presented to healthcare workers (e.g. automated email notifications to raise any ‘red flags’ in the data).
- The potential of online healthcare performance reporting may in future go **beyond the realm of healthcare performance sites** and be integrated into other avenues, such as real estate sites for consumers.

Sustainability

- Performance reporting sites pose a number of **significant challenges** for organisations providing them in terms of **sustaining up-to-date content**, **maintaining current technology** and **responding to the needs of end-users** who want to better understand the volumes of data.
- Such sites are **significant undertakings** that involved numerous staff, complex processes and investment in technology.
- During the initial phase of development, the implementation and management of construction was made more sustainable by **staging the development** (e.g. by sub-sites, patient groups and/or services).
- **Resources required for sustaining up-to-date data and information** should be factored into the site design in the early stages.
- Decisions about the technology employed should be mapped to future plans for the site in the early stages to ensure **scalability and potential integration** with other systems.
- With increasingly sophisticated data available, there is a **need for capacity building** for end-users (particularly healthcare workers) that do not have internal analytical capacity. Empowering them with the capacity to interpret and use the sites via educational and collaborative activities reduces the reliance on those providing the site to assist in this way.
- To be truly sustainable in terms of relevance, there is a need for **proactive, systematic information gathering** from end-users about usage and the outcomes of usage.

It should be noted that most of the organisations visited were large government organisations with the funding, skills and experience to invest heavily in performance websites. For smaller organisations, resources may not be available to follow all recommended processes although, in many cases, the information presented in this report may offer a guide.

Regardless, an overarching message became apparent in the synthesis of these findings, which applies to the relevance, clarity, appropriateness and sustainability of online reporting sites. The creation of performance reporting sites is not a point-in-time exercise. It is a channel that is evolving and dynamic and, as such, demands continual and tailored engagement with stakeholders to reach its potential in informing performance and improvements in healthcare.

Introduction

The Bureau of Health Information

The Bureau of Health Information (BHI) is a board-governed organisation that provides independent information about the performance of the NSW public healthcare system. BHI provides information to a diverse range of stakeholders, including (but not limited to) NSW government agencies, those working in the management of public healthcare facilities, policymakers, those on the frontline of healthcare delivery, the media and the general public. As such, there is a need for BHI to provide performance information in a way that meets a diversity of needs. One of the ways in which BHI provides this is through an interactive online portal, *Healthcare Observer* (bhi.nsw.gov.au/healthcare_observer). Launched in early 2014, this site contains a variety of performance data based on administrative datasets and from the NSW Patient Survey Program.

Background to the project

Healthcare performance measurement provides the opportunity for system improvement and accountability.^{3,7} It contributes to the quality of decisions made by all participants within the health system, including patients, practitioners, managers, governments, insurers and other payers, politicians, and citizens as financial supporters.¹³

Public disclosure of information about the performance of healthcare systems and providers is growing internationally. The two most frequently stated objectives behind this are to stimulate quality improvement; and provide feedback that enhances the accountability of healthcare providers.¹³ In some cases, this reporting also aims to support consumer choice.⁶

Despite this, development of performance measurement has not traditionally been pursued with a clear picture of who the information end-users are or what their information needs might be. Instead, end-users of this information have typically been presented with a wide range of data with the hope that some of it will prove useful. A major challenge for health systems is, therefore, to customise the collection and presentation of performance measures for different stakeholders.¹³

Relative to other sources of performance reporting, the online channel is a newcomer; one for which there is an expansive array of possibilities and the potential for high levels of end-user interactivity. Along with this potential comes the challenge of making the information relevant, readable and easy to understand to an audience with varying technical skills and knowledge about health-related issues.⁴ Adding to the challenge is the growing, often disparate and dispersed volume of performance information in the public domain, creating a risk that end-users will ultimately be deterred from the sites set up to inform them.⁷

While organisations in countries such as the USA, the UK and Denmark have been publically reporting healthcare performance information in various forms for around twenty years, the use of interactive websites as a source of this information is a more recent development.^{5,6} Performance reporting through online, interactive channels can now be found in many countries including the USA (medicare.gov/hospitalcompare), UK (nhs.uk/myhhs), Canada (yourhealthsystem.cihi.ca), the Netherlands (kiesbeter.nl), Sweden (socialstyrelsen.se/aldreguiden) and many other, predominantly developed, countries.

In some countries such as the UK and Canada, the journey into developing these sites began earlier than it did in Australia, although concerted efforts to improve the information they provide continues. Learning from the experiences of these organisations was the primary goal of this Hospital Alliance for Research Collaboration (HARC) project. More specifically, the goal was to better understand how to optimise the online delivery of healthcare performance data in a relevant, clear style that encourages uptake by stakeholders, while operating in a manner that is sustainable to implement and manage.

The primary focus of the investigation was to identify the *approaches* and *processes* undertaken in building and managing these sites. It is not an assessment of data visualisation, website development or performance reporting. While these areas are touched upon, they lie beyond the scope of this research.

This evaluation was undertaken by Katinka Moran on behalf of BHI through funding by the HARC scholarship. International interviews were conducted between the 3rd and the 12th June, 2015.

Methods

England and Canada were identified as two countries where government and/or other organisations offered well developed online healthcare reporting sites or tools, or were at the late stages of developing them. The primary method of data collection was interviews with key staff in five organisations in these two countries, discussing eight reporting lines (Table 1). Findings were complemented by a rapid literature review that looked more broadly at research into this area.

Table 1: Organisations visited and online performance reporting sites and tools discussed

Country	Organisation	Website/Tool	Launch	Summary of content (at time of visit)	Audience
Canada	Canadian Institute for Health Information (CIHI)	<i>Your Health System - In Brief</i> yourhealthsystem.cihi.ca/hsp/inbrief	Nov 2013	A small number of comparable indicators (five as of Oct 2015) on the relative performance of the health system in Canada as a whole, or in provinces/regions compared to other parts of the country.	Consumers
Canada	CIHI	<i>Your Health System - In Depth</i> yourhealthsystem.cihi.ca/hsp/indepth	Sep 2014	A broader set of indicators (45 as of October 2015) at national, provincial/territorial, regional and facility levels.	Healthcare workers
Canada	CIHI	<i>Your Health System - Insight</i> secure.cihi.ca/mstrauth/ctl/hspInsight	March 2015	A secure access site initially offering drill down to patient-level data for 10 indicators.	Healthcare workers
UK	NHS	<i>My NHS</i> beta website nhs.uk/mynhs	Nov 2014	Information about health and social care services in England, in which performance and outcomes can be compared for NHS services such as hospitals, GP practices or mental health services, specialist treatments, care homes and public health programs.	Consumers, healthcare workers
UK	Care Quality Commission	Inspection Reports on the Care Quality Commission website cqc.org.uk/content/inspection-reports	2009	Performance ratings of five key indicators and a range of tailored indicators for a variety of healthcare services such as hospitals, GP practices and care homes.	Consumers, healthcare workers
UK	Nuffield Trust	Quality Watch website qualitywatch.org.uk	Oct 2013	Evaluation of 300 indicators designed to explore changes in the quality of health and social care over time. Categorized by six domains and five sectors.	Healthcare workers, policy makers
UK	Dr Foster	<i>My Hospital Guide</i> website drfoster.com/innovation/hospital-guide/	2001	Performance assessment of NHS hospitals (and, in 2013, commissioning) across England.	Consumers, healthcare workers
UK	Dr Foster	The suite of Dr Foster tools (e.g. Care Quality Tracker, Quality Investigator) (no access to these proprietary tools was granted)	Feb 2006	A range of dashboard and analytical tools that focus on a variety of healthcare settings (e.g. GP practices, acute care) and associated indicators.	Healthcare workers

Findings

The following section presents the findings of the rapid literature review that was conducted prior, during and after the visits to Canada and the UK, along with the findings from the interviews undertaken across these areas.

Literature review

A literature review was conducted, with a focus on scientific and grey literature that addressed the subject of designing online healthcare performance reporting sites. This review was conducted using the Clinical Information Access Portal and Google Scholar and included the following terms:

- health* AND performance AND report*
AND
- web OR online OR internet OR digital.

The search was conducted for papers produced since 2000 that were written in English.

The review found a very limited amount of literature specifically regarding the development or evaluation of online reporting of healthcare performance data. The most relevant paper was a comprehensive study by Damman et al (2010) evaluating the presentation of online comparative healthcare information and how the integration of different information types (i.e. service characteristics, quality based on performance indicators and quality based on user experience) is dealt with in 42 websites across 10 different countries.⁶ The relevant key findings from this analysis were as follows:

- The most common ways to integrate different information types (sources) were at the two extremes:
 - No integration at all (on 36% of the sites) and high levels of integration in single tables (on 41% of the sites). The authors state that an important benefit of high level integration was the fact that all information can be viewed as an overview, which may contribute to the clarity and make it easier to cope with a large amount of information. However, a potential drawback was that on a website, such an overview cannot take up too much space, in addition to the concern that a webpage may then have a higher chance of containing contradictory information. Other possible drawbacks in the highly integrated approach were that more specific information could be difficult to find and the flexibility to apply different search strategies is reduced.
 - The opposite, no or very limited integration, was also considered to have possible drawbacks, such as the viewer not seeing a large part of the information, or failing to notice important elements of the information. Furthermore, with less integration, users may need to undertake many steps to find the information they seek. An approach cited by the authors is to help users to choose their

own priorities from the major dimensions of healthcare and use self-selection menus to do so. It was concluded that a certain level of integration is necessary to prevent users overlooking important information or getting stuck in too many decision steps.

- Most sites contained, in one way or another, both summary and more detailed information, with the summary information usually presented in tabular formats and usually with a limited number of attributes (about three to seven).
- In the tables, the use of rows for providers and columns for attributes was the typical format for displaying summary information, whereas the opposite was used for more detailed information (after selection or drill down paths). The authors concluded that it is not the direction of the information display that is important, so much as the information complexity. They recommend that for consumers, who may only view the summary information, these tables should contain a limited number of providers and attributes.
- In another of the papers found on the subject – a more recent study by Damman and colleagues involving primary research – the authors concluded that although consumers may find it easier to comprehend comparative data with fewer providers, it can be difficult in practice to reduce this number as it might interfere with the purpose of creating full transparency. In this case, a common approach is to let consumers search for providers in their geographical area and only display the ones that fall within a self-chosen distance. If this still leaves consumers with a relatively high number of providers to compare, showing only providers with the best performance on key indicators is an additional option, while ensuring it is clearly communicated that such a selection has been made and that more providers are available for review.⁵
- Drill-down paths are suggested as the means to layer information and comprehensibly provide a large amount of information, and this was done on most sites reviewed (nearly 70%). They also suggest that it may be necessary to inform users on the home page about the amount of information that can be viewed on the site, so they don't miss areas of interest.
- Numbers were used on the majority of sites (88%) to display comparative information, despite evidence that consumers have difficulty evaluating numbers.
- On a large number of the sites, information was presented using symbols (frequently stars). The authors commented on the evidence that these help consumers sort providers into categories of better and worse and might more easily attract attention when compared with numbers and words. However, it was noted that where there is text-symbol incongruity, symbols may decrease message comprehension.

When published in 2010, Damman and colleagues concluded that more transparency about the effectiveness of the chosen formats on sites was greatly needed, as approaches to presentation of findings did not seem to be systematically selected and the rationale of design was largely unclear. The authors advocated for evidence-based quality criteria in approaches to the presentation, along with research to assess how different sites meet these criteria.

While Damman et al focused on the content of performance reporting sites, a review of research by the King's Fund looked at assessment of local health system performance at the system level. In their review, the authors recommended rationalisation and improvement of existing websites in the UK, as they were not considered to be easy for the public to access or comprehend. They suggested the aim should be a single site for all information intended for public use, or links within a site to other local performance sites. Similarly, they recommended consolidation of the numerous websites directed at NHS organisations, with added functionality to interrogate the data.⁷

There is also a substantial body of research that focuses on best practice in the presentation of healthcare performance information *more generally*. Much of this covers principles that are likely to apply to all publication channels, including online. A comprehensive meta-analysis of such literature conducted by Sander et al (2015), found 13 relevant articles published between 2001 and 2013; predominantly from the USA and mostly with regards to consumers as the audience.¹⁴ The analysis of these articles along with a complementary study conducted by the authors, concluded that in the context of hospital 'report cards' the following five principles were generally agreed upon. More detail about the evidence for other aspects of presentation can be found in the article and include:

- Avoid tables without (interpretive) symbols
- Include bar charts with (interpretive) symbols
- State explicitly whether high or low values indicate good performance or provide a 'good quality' range
- Avoid incomplete data (N/A given as a value)
- Rank hospitals by performance.

An additional meta-analysis conducted by Hildon et al (2011) analysed 30 studies of a similar nature to the Sander study.⁸ They found that while their analysis was limited by the lack and heterogeneity of studies on the subject, certain conclusions could nonetheless be drawn. From the studies they examined, which were mostly quantitative and mostly with consumers, they concluded the following:

- Tables appeared accessible to all and tables and pictographs appeared better understood than bar charts (despite the latter being preferred)
- Pictographs were accessible to less numerate and older populations, but tended to lead to more risk avoidance
- Aspects of content that enhance data displays included: ordering by rank and relevance of information; consistency (in symbols, colours and metrics); and visual explanatory cues and contextual information, while maintaining simplicity (i.e. 'less is more')
- Uncertainty (e.g. the use of confidence intervals) was not widely understood or well represented
- The impact of newer formats, such as funnel plots, needed to be evaluated further.

While the aforementioned studies covered research into a mostly consumer audience, a qualitative study conducted in the UK by Allwood et al (2013), explored the views of 107 clinicians in terms of comprehension and preferences for format and content of healthcare performance data.¹ They found that in many ways, clinicians' views were similar to those of consumer groups, with the main difference being that clinicians placed more importance on the need to consider statistical uncertainty, regardless of their conceptual grasp of the concept. Other key findings from this study were that this audience desired:

- Data in more than one format (usually a simple summary, followed by more complexity)
- Explicit displays of comparative performance (i.e. rank ordering)
- Explanations (of unfamiliar formats like funnel plots and of statistical uncertainty).

Concurrent to these findings, other relevant information was incidentally found during the review. In short, this included recommendations to:

- Present performance information at three levels: a small number of headline indicators (15–20) of particular relevance to the public; a wider range of data in line with national priorities or frameworks; and indicators from other sources to provide a more comprehensive picture⁷
- Employ explanatory frameworks for healthcare quality to help consumers understand performance information⁵
- Avoid the use of summary scores for local health systems⁷
- Complement performance data with explanatory information to maximise a report's use and impact¹⁵
- Provide patient-level performance data to assist in refining educational programs for health providers, as well as highlight any areas of concern for quality improvement¹¹
- Enhance the capacity of healthcare managers and clinicians to understand and use performance information such that it becomes intrinsic to clinical education and lifelong professional development.¹³

Finally, although few studies were able to systematically evaluate the impact of hospital comparison sites beyond simple usage figures, there is evidence that uptake by consumers and providers is low.^{2,9} This suggests that sites that report on the performance of the healthcare system are yet to reach their full potential.

Interview findings

The primary objective of this evaluation was to better understand how to optimise the online delivery of healthcare performance data in a relevant, clear style that encourages uptake by stakeholders, while operating in a manner that is sustainable to implement and manage.

Some of the information was provided by interviewees on the condition that it would be synthesised into overall findings, rather than attributed to the organisation or individual. Hence, this analysis presents a synthesis of findings, with specific reference to organisations only where appropriate. It is framed around these components of the research objective:

- Relevance
- Clarity
- Appropriateness to stakeholders
- Sustainability.

Relevance

For all organisations, stakeholder consultation was considered essential in determining which measures were relevant to report. Some went through a major process of consultation with end-users for this purpose, mostly during the early stages of concept development. Many also had feedback systems in place to ensure the ongoing relevance of their sites. In some cases, relevance to an existing framework guided the selection of measures throughout.



The work by Canadian Institute for Health Information (CIHI) provides a good case study into the depth and breadth of consultation employed in ensuring the relevance of the *Your Health* site and the sub-sites within. This site offers two pathways – *In Brief* for consumers and *In Depth* for healthcare workers. In the early stages of development, both went through a comprehensive, but unique consultation phase; the process for the *In Brief* has since been published.¹⁰

For *In Brief*, the development process included five consumer focus groups in diverse Canadian locations, as well as an online exercise (i.e. the 'Choicebook') undertaken by over 3,000 consumers across Canada. The scope of feedback requested in each was framed in terms of the four main quadrants of the CIHI Health System Performance Framework – Inputs, Outputs, Outcomes and Social Determinants of Health – with fictional stories to help illustrate each (Figure 1).

Figure 1: Fictional scenario used to aid respondents' understanding of the CIHI Health System Performance Framework and its dimensions

Fictional Scenarios (Outputs 1)

Nguyen's story (about access)...
Nguyen is an elderly lady who lives in Alberta. She has been waiting 6 months for a hip replacement. She is in pain and having trouble walking. She is getting frustrated that she's had to wait this long for her surgery.



For the online exercise, respondents were asked to indicate their level interest in each of the quadrants on a scale of one to seven, then asked to evaluate their interest in eight of 16 performance dimensions (16 was considered too many for one respondent) which were organised under the four quadrants. Finally, respondents were assisted in determining priorities via an exercise asking them where fictional health dollars should be spent, with 100 'CIHI Bucks' they could allocate to a single or multiple dimensions. Conclusions from this exercise were drawn based on the intersection of participants' interest and prioritisation of the measures, and were weighted to be representative of the Canadian population from a demographic perspective.

During the focus groups, participants were asked many of the same questions as in the online exercise, to assess if the engagement channel had an impact on responses (this was found to be minimal) and to allow participants the opportunity to elaborate on their decisions.

Following the consumer consultation phase, CIHI worked with a group of experts from across Canada to select 15 key indicators in the areas identified by the public as the most important. Selection criteria included whether the indicators were valid, reliable, easy to understand, and pan-Canadian in scope.

The development of the *In Depth* site targeted to healthcare workers followed that of *In Brief* and for this, CIHI relied on many working groups with end-users, including a content development working group, a communications group, a web group and a performance testing group. These groups included regional and facility-level end-users and stakeholders across Canada. A variety of approaches was used to gain feedback on relevant and desirable content from the content development group.

As a first step, a group of 'super-users' who represented the target audience were shown screen shots of ideas to ascertain what they wished to see and what was important to them. As a second step, they were invited to a web conference in which a prototype site was viewed, during which a web poll was run to gather their feedback and further refine the site. In addition to this formalised process with the 'super-users', other key stakeholders were also consulted during the development of *In Depth*, including a small hospitals group, a district performance group and individual experts in performance reporting.

Briefly, during the visit, CIHI were in the process of developing another online tool for healthcare workers, *Insight* – an analytical, web-based tool offered in a secure private site. *Insight* offers healthcare workers aggregate and patient-level data and was intended to complement the data provided in *In Depth*. Prior to this, patient-level data (referred to as by CIHI) was only provided by request, but was said

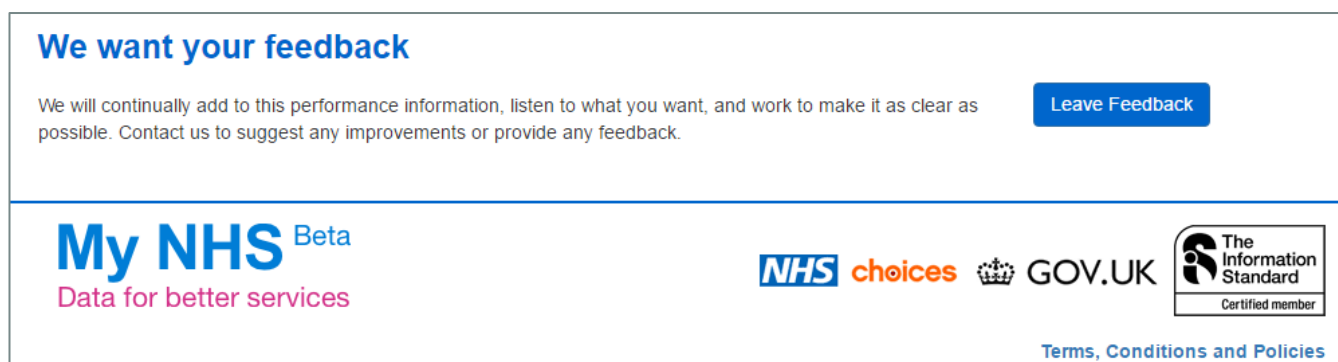
to be of great interest to healthcare workers, as it allows them to dig deeper and further understand their results.

This example from CIHI was detailed as it illustrates the extent of activities that can be undertaken in the development of online reporting tools, to ensure the content's relevance to the end-users, in a situation where there are multiple audiences to address. It also demonstrates the use of a pre-existing framework in guiding the development, so that the result is a site that is relevant not only to the end-user, but can feedback on performance at a system level too.

The other organisations visited also undertook considerable consultation to ensure their sites were relevant to end-users, but approaches differed, demonstrating the variety of options available for this process. A brief look at the processes undertaken for the *My NHS* beta site and that of the *Quality Watch* site illustrate this.

In the case of *My NHS*, there was regular consultation with a variety of stakeholders (e.g. Commissioning Groups, Department of Health, NHS England, external specialist groups) to agree on what to publish and what it would look like. Many of these stakeholder groups were then responsible for liaising with specific stakeholders within their circles and feeding back their comments, adding to the layers of consultation. They did not directly engage consumer groups, however, as the site was not considered to be primarily targeted towards this group. However, the site has been in a publicly released beta phase for over one year and in that time has actively welcomed feedback from all users while continually evolving (Figure 2). Having the capacity to receive real time feedback and reinvent is one of the opportunities for maintaining relevance that the online channel offers.

Figure 2: Invitation to provide feedback available on the *My NHS* beta website (accessed 22 Feb. 2016)



The screenshot shows a feedback invitation on the My NHS Beta website. At the top, it says "We want your feedback" in blue. Below this, a paragraph reads: "We will continually add to this performance information, listen to what you want, and work to make it as clear as possible. Contact us to suggest any improvements or provide any feedback." To the right of this text is a blue button that says "Leave Feedback". At the bottom left, the "My NHS Beta" logo is displayed with the tagline "Data for better services". In the center, there are logos for "NHS choices" and "GOV.UK". On the right, there is a logo for "The Information Standard" with "Certified member" underneath. At the bottom right, there is a link for "Terms, Conditions and Policies".

For the *Quality Watch* site, the focus is on quality of care at a system level, and so the process of determining relevant content was a five step process that began as a more academic exercise. The organisation started by gathering data for all possible indicators (approximately 1,500). They then examined these internally to cull the ones that were obviously unsuitable based on a multitude of criteria (e.g. not useful, well covered elsewhere, poor quality, incomplete, discontinued, etc.). To determine the remaining indicators they then considered quality frameworks (and decided on the 'Quest for Quality' report),¹² which resulted in a selection of around 500 indicators. This selection was subsequently reviewed and corroborated by prominent policymakers and academics (including Nick

Black and Veena Raleigh). As a last step, Nuffield Trust conducted a consensus exercise with patients, carers, clinicians and managers on what these individuals thought was important with reference to quality. This assisted the development by identifying measures that were important to include.

As the relevance of a site's content changes as the needs of its users evolve, these processes should not cease once the initial development phase has finished. The notion of having a continuous feedback system to maintain the relevance of a site was raised by several interviewees. In addition to the aforementioned feedback form on the *My NHS beta* site, the Care Quality Commission site provides a good example of this.

While the Care Quality Commission site in general has a prominent 'share your experience' link, the related form is structured around experiences of care. However, to get feedback on their site, they have used online forums (for consumers and providers) and pop-up surveys for a variety of testing and development functions. Interestingly, Nuffield Trust once had a feedback function on the *Quality Watch* site, but as it was rarely used, it was taken off and this purpose was instead addressed by Twitter, as it was receiving more traction; yet another opportunity for feedback that arises in the online context.

Finally, despite the efforts undertaken by these organisations to ensure relevance of their sites to end-users, in some cases, there was a mandate for reporting agencies to add content to the sites that was not actively requested by users, but was relevant from the perspective of government or regulatory agencies.

Clarity

Interviewees from several organisations stressed the efforts they had gone to in ensuring the information presented on their sites was clear to users, in terms of interpretation of results and navigation. This seemed particularly important in light of information that compares the performance of healthcare providers. These efforts occurred throughout any or all stages of development, from concept to prototype to beta sites. For some, there was a continual process of collecting feedback to ensure users were able to access and understand the information.

In the same way that the examined sites differed, so too did the way in which the organisations employed user-testing strategies to ensure their audiences could find and understand the information they were looking for.

In the case of CIHI, following the prototype development, the first version of *In Brief* was user-tested by approximately 250 consumers, which led to a number of design changes. More recently, before the addition of long-term care indicators to the *In Depth* site, CIHI provided a five-week window for healthcare workers to preview their results and provide feedback. This was supported by CIHI-hosted web conferences to guide them through the data preview process and answer initial questions and concerns. This demonstrates how different approaches can be used to engage the different audiences.

For the *My NHS* beta site, an online feedback form (which has already driven some content on the site) is intended as a permanent feature. All comments that come through this form are distributed to and processed by the associated *My NHS* team, whether about design or data. In comparison to the CIHI approach, this has the benefit of being a continuous collection, although its main shortcoming is that it is a passive form of stakeholder engagement and difficult to assess the representativeness of those providing feedback.

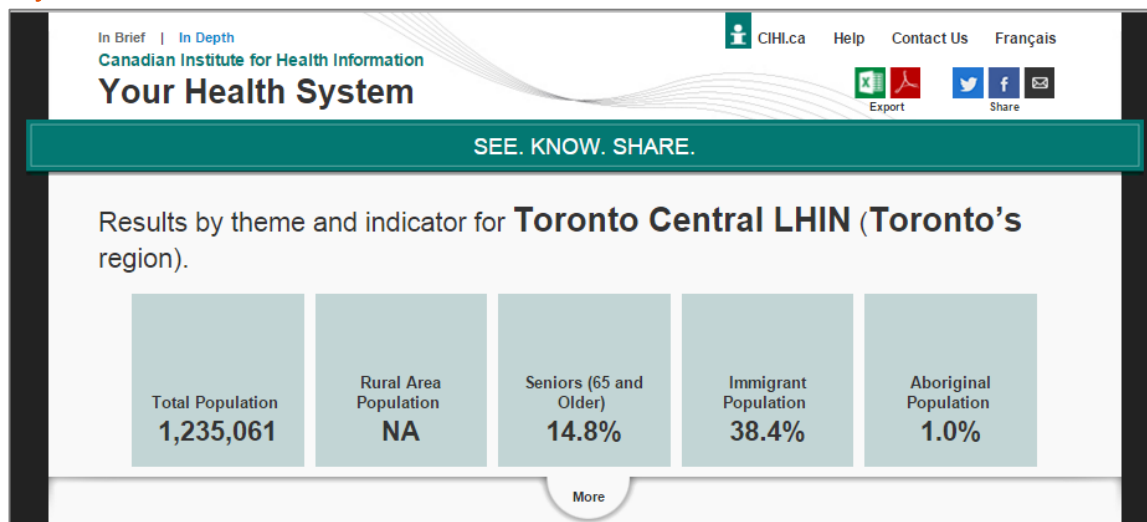
The Care Quality Commission has also undertaken considerable user-testing of its online *Inspection Reports*, in order to develop the site and make it more publicly-oriented – historically, this site was more provider-focused. Their user-testing consisted of ‘moderated lab sessions’ testing the site, mainly with people in the market for healthcare, as well as by a smaller number of providers. Participants used a prototype site for an hour and were asked to complete certain tasks, or asked how they would go about certain tasks. To advance this further, their eye movements were tracked and recorded. The site went through several iterations during the testing; responding to feedback from these sessions.

As far as the amount of content, there was general consensus that to be easy to navigate and interpret ‘less is more’. This meant not having too much repetition of content between different views (although a certain amount is often required) and aiming for a minimum amount of content to answer the questions their users asked (which differed depending on the audience, as it was generally considered that healthcare workers could process and wanted more detail).

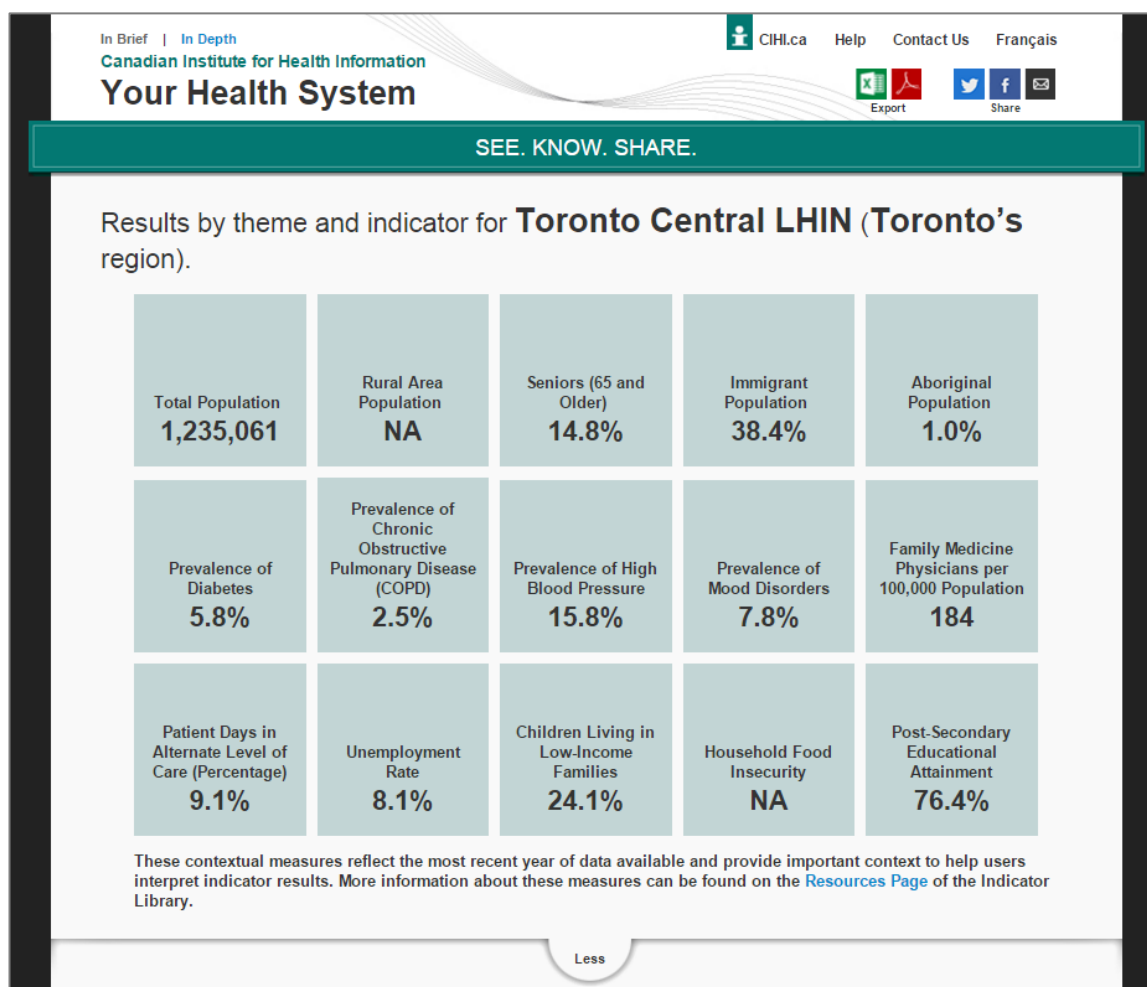
In some cases, the sites displayed only a truncated amount of information which the user could expand upon if they chose, such as the demographic summaries used on *In Depth* that add context to the results but are not seen as essential to the display (Figure 3).

Figure 3: Different levels of contextual information provided on *In Depth* (accessed 8 Jan. 2016)

Default view



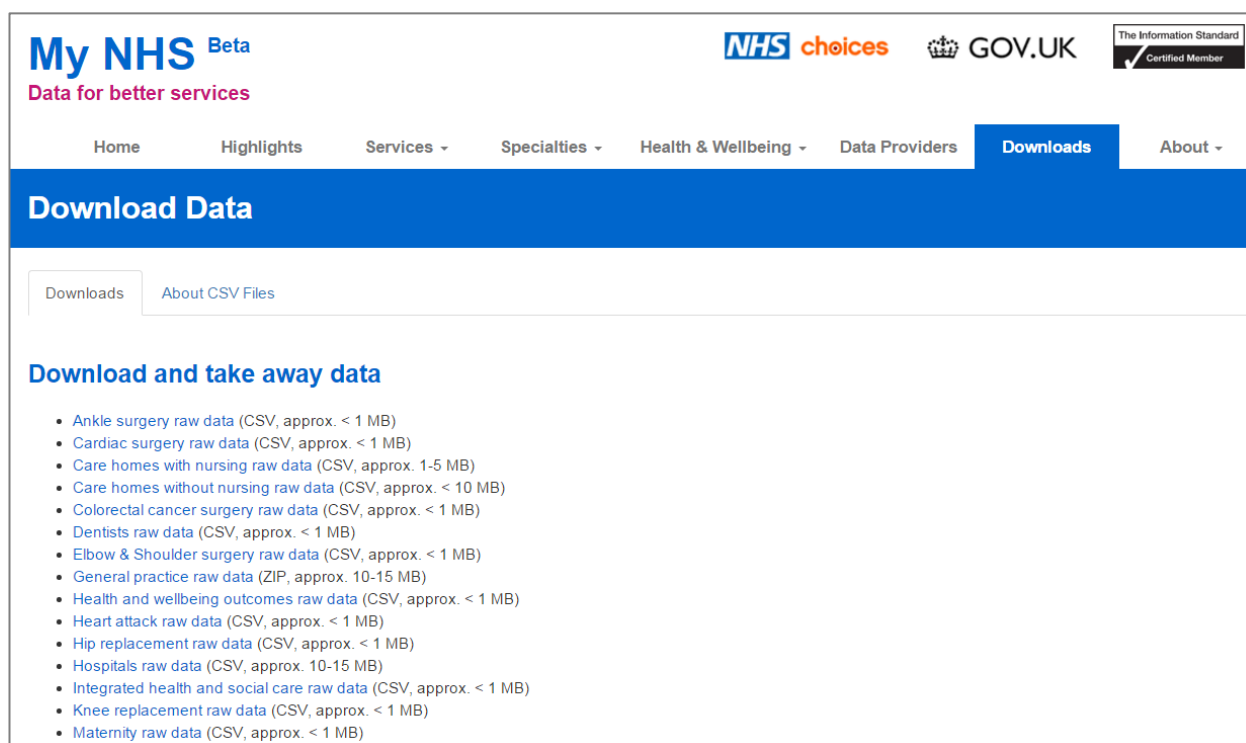
Expanded view



To add to the clarity of information presented, the site's visuals tended to be used more for overarching comparisons, while downloads such as data files and PDFs were used for more detail. In line with this, additional statistical information such as confidence intervals was generally not shown by default in the main displays, although having it available was mostly seen as essential when comparisons were made and hence, it was made accessible elsewhere (e.g. switch on buttons, or in supplementary information). Methodological information was also seen as something that should be available, but stored outside the main displays.

Data files detailing the information behind the site were said to be particularly desirable by healthcare workers and when provided, they were usually provided as a link on the same page as the summary of results (as seen in Figure 3), or in the first layer menu (Figure 4).

Figure 4: My NHS main menu, contents of the 'Downloads' tab (partial) (accessed 26 Feb. 2016)



Finally, written interpretation of the graphics is also a feature that was used by some to clarify the results and make them more accessible to a broader audience. The way this was delivered and the extent of it varied by site, largely as a consequence of the different functions of the sites. For example, all results shown in *Quality Watch* and *My Hospital Guide* include, a short interpretive summary alongside them (Figure 5), while for the *Inspection Reports*, which are required for regulatory reasons, a full, written PDF report is available from a tab on the same page as the summary results (Figure 6).

Figure 5: Interpretive text offered on *Quality Watch* (accessed 8 Jan. 2016)

QualityWatch

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INDICATORS
Ambulance response times

Treatment waiting times

HAVE YOUR SAY
Waiting times for outpatient appointments

SEARCH

NEXT

How long do people wait for treatment to begin?

While waiting no more than four hours from arrival to departure is the iconic measure of A&E performance, there are other important steps in the process where waiting time is important. This chart shows how long patients wait between arriving in A&E and their treatment beginning (in whatever form that takes). People's average experience (the median) has changed little since 2011 and stands at around 50 minutes. Interestingly, the 95% percentile value - that is, waiting times for some of the patients that wait the longest - has fallen slightly over time, from 195 minutes in May 2011 to 181 minutes in July 2015. It's worth noting that this measure can be sensitive to data quality issues.

Figure 6: Interpretive text and PDF offered on online *Inspection Reports* (accessed 26 Feb. 2016)

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Reports

Inspection carried out on 22 January 2014
During a routine inspection

The inspection focused on cancer services provided by The London Clinic. During this inspection we visited wards in the Duchess of Devonshire Wing, the colorectal and breast cancer wards and the radiotherapy unit. We spoke with 23 staff, including nurses, ward managers, clinical nurse specialist's, pharmacists, dieticians and senior managers. We also spoke with five patients and three relatives of people using the service who were available during our inspection or had contacted us prior to it.

The majority of patients were very positive about the care and treatment they had received, however two people raised concerns about their experiences of care on one ward.

We found people received safe, effective care that was planned in a way that ensured their safety and welfare. Peoples' needs were assessed and reviewed by a multi-disciplinary team. Information was provided in a format that met people's needs to ensure they understood and were able to make decisions. Patients had mixed views about the standard of food available but the majority were satisfied with the quality and choices available.

There were arrangements in place to deal with medical emergencies. Treatment protocols and procedures reflected national guidelines and medications were safely administered. Medicines were stored securely.

There were sufficient staff available to meet the needs of people but we noted there was a concentration of agency staff working in the ward people had raised concerns about which may have contributed to people's poor experience. There were systems in place to monitor the quality of service provided.

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Appropriateness to stakeholders

Although some sites were aimed at both consumers and healthcare workers, most were not. There are considerable differences in the needs and interests of the two groups which led to differences in the content and graphics of the sites that were uniquely designed for only one of the two audiences. In general, graphics and content were intended to be simple for a consumer audience, while healthcare workers were presented with more complex graphics, statistical analyses and additional layers of information. In line with this, one interviewee proposed that healthcare workers are interested in credibility and consumers in interpretability.

The sites assessed had a mix of target audiences. Some had a singular focus on healthcare workers (i.e. *Quality Watch* or Dr Foster's proprietary tools), some had a single tool which targeted healthcare workers and consumers (i.e. *My NHS*, *Inspection Reports*) and some used separate tools to individually target healthcare workers and consumers (i.e. *Your Health System*).

There is already a considerable body of literature on the presentation and navigational features that are appropriate for different online audiences and assessing this is not the focus of the report (see the 'Literature review'). Although less common, there is also a substantial amount of literature on the most suitable format and content to present healthcare performance data. Although this literature is not specifically about online reporting, in general the feedback from the interviews suggests that guidance around presenting performance data online largely reflects guidance on how to present this data in any format, with some exceptions that are relevant only to an online channel.

Overall, the specific features of performance reporting sites recommended by several or more of the interviewees were as follows.

For consumers

- Information on how the system is doing overall/higher level, except if searching for information to make specific treatment decisions, in which case local level is better
- Limited, but more text than for healthcare workers (for the purpose of education in how to use the site and interpret the results)
- More contextual information (e.g. descriptive statistics about a selected area such as the average age of residents and employment rate)
- Fewer indicators in general and per page
- Easy, familiar visuals (e.g. no funnel plots)
- Presentation of the top 10% and bottom 10% of performers
- Simple score cards (see Figure 7)
- Ability to reach destination in one click (which also makes it easier to share).

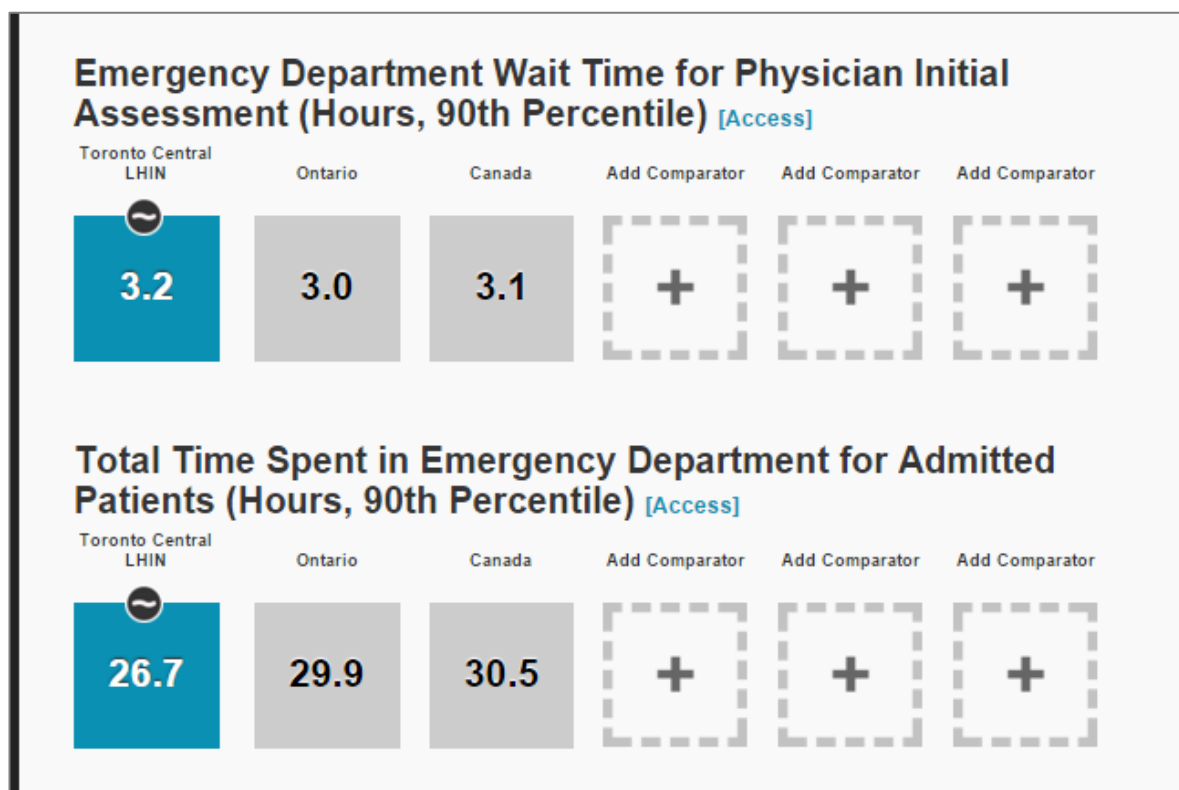
Figure 7: Summary of performance indicators on My NHS (accessed 26 Feb. 2016)

Sort by distance	Care Quality Commission inspection ratings	A&E performance	Mortality rate	Recommended by staff	Infection control and cleanliness	Percentage of patients waiting less than 18 weeks	Friends and Family Test: Inpatient
University Hospital Lewisham Lewisham High Street, London, SE13 6LH Tel: 020 8333 3000 4.9 miles away <input type="checkbox"/> Add to shortlist	 Requires Improvement Visit CQC profile	91.2% Patients seen within 4 hours	 As expected in hospital and up to 30 days after discharge (0.9778)	 Within expected range with a value of 58%	 Among the worst	 92.4% of patients waiting less than 18 weeks from referral	93% Patients recommend this hospital. 738 responses
St. Ann's Hospital St. Ann's Road, London, Greater London, N15 3TH 4.8 miles away <input type="checkbox"/> Add to shortlist	n/a Not yet rated	95.3% Patients seen within 4 hours	 Better than expected in hospital and up to 30 days after discharge (0.6605)	 Within expected range with a value of 66%	 As expected	 92.3% of patients waiting less than 18 weeks from referral	n/a Data not available

For healthcare workers

- Results for a hospital or region
- Comparison with peers (Figure 8)
- Using risk-adjusted metrics
- Comparison to benchmarks
- Patient subgroup breakdowns
- Ability to see who is performing well (although most sites avoid directly ranking)
- More sophisticated levels of detail and graphics (e.g. funnel plots)
- Overall roll-ups of indicators (which point to areas that healthcare providers/managers need to take action on and allow time poor managers to quickly access their results)
- Ability to drill down to patient-level data
- Ability to see physician-level and ward-level data (although some issues in both attribution and data quality were noted)
- Ability to link survey data to other administrative data (although some issues in privacy, permission and response rates were noted)
- Ability to download results as a data file or a PowerPoint presentation for a selected hospital or district
- Appropriate levels of validity and robustness to achieve credibility.

Figure 8: Comparison of districts on *In Depth* (accessed 8 Jan. 2016)



Of particular note was the mention in both Canada (CIHI) and the UK (Dr Foster) of the added utility for healthcare workers of being able to drill down to patient-level data. Interviewees from these organisations claimed that this function was considered by their healthcare workers to offer great value in terms of being able to better understand results and take appropriate action. At CIHI the aim at the time was to seamlessly integrate this information as a deeper layer within *In Depth*, while for Dr Foster this was delivered through their syndicated online tools. Naturally, in both cases, this information was provided at a secure, non-public level.

Finally, there was interest at a few of the major organisations in using performance reporting sites as a central hub or 'shop window', from which the sub-sites sit and/or where there are links to other external data (e.g. other performance data, big data). This idea was proposed mainly for use by healthcare workers; however it was not universally popular, as there was concern that a site like this could become 'one source of the truth'. Others were looking further at alternative uses of the data and were considering options for feeding the performance data through to other sites. An example was taken from the English real estate site Rightmove.co.uk, in which the performance of local schools is overlaid on real estate maps. This model was considered a possibility for the inclusion of local healthcare provider ratings. This kind of big picture thinking was a reminder of how the field is still relatively new, with much potential that is yet to be explored.

Sustainability

Performance reporting sites pose a number of significant challenges to the organisations providing them who, after building the sites, face the challenges of sustaining up-to-date content, of maintaining current technology and of responding to the needs of end-users who want to better understand the volumes of data they can now access, sometimes for the first time.

In all cases, the sites were significant undertakings that involved numerous staff, complex processes and investment in technology. During the initial stages of development, the implementation and management of them was commonly made sustainable by staging the development, where development of one stage informed and smoothed the path for the next. Furthermore, it was considered that given the novelty of some of the data and formats, staging allows end-users to gradually become familiar and more comfortable with the sites, thereby sustaining their interest. In the case of the *My NHS* beta site, the stages were focused on building on the levels of reporting and patient groups included, by starting with only a small number and getting feedback from stakeholders throughout to feed into a roadmap on future additions. For *Your Health System*, the staging regarded the different sub-sites, with *In Brief* coming first, followed by *In Depth* and then *Insights*. In addition to this, CIHI also staged the health services covered.

Efforts are also required to keep the sites up-to-date and end-users desire timely data. While discussions with interviewees about the processes in place to update the data were limited, in some cases, the process was largely manual, such as the written summaries in *Quality Watch*, which was said to be done by the equivalent of two full-time staff. This example illustrates that the resources required for sustaining up-to-date data and information should be factored into the site design in the early stages. Resourcing the work appropriately is clearly essential to this process.

Unlike other avenues for performance reporting, online reporting sites are subject to the ever-changing landscape of technology. In most, possibly all cases, the organisations used customised software programs. For many, technological redundancy was not yet an issue due to the site's relative novelty, although early mapping of the technology employed to the future plans for the site was highlighted as being a beneficial, if not essential, exercise. For one organisation, despite rigorous attempts to carry out this mapping in the early conceptual stages, issues still arose when it came to integrating different parts of the site, as different software systems had been employed in each. This highlighted the level of care and forward planning needed to smooth the path for future development of these sites.

In addition to these challenges, interviewees pointed out the two way nature of the relationship with their audiences, particularly healthcare workers. As use of online reporting has increased, so too has the amount of data available. Some organisations do not have the internal capacity to process this data and this can lead to an inability to use it for quality improvement activities. As most organisations did not have the one-on-one relationship with their end-users that a commercial organisation such as Dr Foster has, there was a need, on a broader scale, to help them understand and use the data.

In anticipation of this, CIHI put efforts towards sustaining the interest and function of the data they report by offering workshops to healthcare workers across the country to help them understand and use performance data, resources and tools (i.e. Health System Performance school), as well as a day for

attendees to share experiences and successes in using data for decision-making (i.e. Health Data Users Day) (Figure 9). This was seen as important not only to reduce the burden on CIHI to provide this assistance going forward, but to reduce the disparity in the value that can be gained from the data, given the different analytical capabilities of end-users.

Interestingly, despite considerable efforts to involve end-users in the development of these sites, there was a lack of data or feedback about uptake of the sites by different audiences. At the time of the visit, most of the organisations did not yet have systems in place to collect this information and most feedback of this nature appeared to be anecdotal. In some cases, the sites were considered to be too new to assess and in the case of Dr Foster, the nature of the relationship meant this was seen as less of an issue, as feedback came through continuous engagement with clients. One senior interviewee suggested that organisations must be very proactive about collecting information on the effectiveness of these sites, such as by collecting stories as they happen, asking users the three ways they use the data to make changes, and/or asking for feedback through the site. To be truly sustainable in terms of not only development and management, but relevance, this was an area of obvious need.

Figure 9: Screenshot of information about CIHI's Health Data Users Day (accessed 8 Jan. 2016)

Health Data Users Day
Halifax 2014
Tuesday, November 18

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Health Data Users Day Halifax 2014 is now sold out!

Exploring data: from abstract to action
Join members of your community and experts from other regions for thought-provoking presentations and discussions. Learn about experiences and successes—large and small—with using data effectively for better decision-making in the health system.

To be held at the Westin Nova Scotian hotel, this 1-day regional event will focus on

- Big data and other analytical opportunities
- How data is used at different levels
- How data is used for process improvement initiatives
- How to condense data to make it actionable
- CIHI's data and tools/resources in use across Atlantic Canada

Stay tuned to this website for updates on our program and speakers.

If you have any questions, please contact us at conferences@cihi.ca.

Note: This conference will be held in English only.

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