Rapid EVIDENCE Reports

The Effectiveness of Digital Surveys for Collecting Patient Feedback

in Newfoundland and Labrador

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July 2016

Newfoundland & Labrador Centre for
APPLIED
HEALTH
RESEARCH
www.nlcahr.mun.ca

Rapid EVIDENCE Reports

Contents

This Rapid Evidence Report was prepared by the Newfoundland & Labrador Centre for Applied Health Research (NLCAHR), Memorial University. It was developed through the analysis, interpretation and synthesis of scientific research and/or health technology assessments conducted by other parties. It also incorporates selected information provided by expert consultants in the subject area. This document may not fully reflect all the scientific evidence available at the time this report was prepared. Other relevant scientific findings may have been reported since completion of this synthesis report.

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About This Report

About NLCAHR

The Newfoundland and Labrador Centre for Applied Health Research, established in 1999, contributes to the effectiveness of health and community services in Newfoundland and Labrador and to the physical, social, and psychological wellbeing of its population. NLCAHR accomplishes this mandate by building capacity in applied health research, supporting high-quality research, and fostering the effective use of research evidence by decision makers and policy makers in the provincial healthcare system.

About *Rapid Evidence Reports*

NLCAHR designed *Rapid Evidence Reports* to provide support for evidence-based decision making in the Newfoundland and Labrador healthcare system on an expedited basis as compared to the lengthier *'Evidence in Context'* reports issued through the Contextualized Health Research Synthesis Program. Through these expedited reports, NLCAHR provides a succinct review of recent research evidence on a high-priority research topic selected by decision makers in the province.

Rapid Evidence Reports include:

- A clear statement of the issue and the background to the issue/problem;
- A description of the scope and nature of the pertinent English-language scientific literature from the past five years;
- A summary of the principal features of the available evidence – points of consensus, points of disagreement, areas of uncertainty or silence on some or all of the following issues: effectiveness of interventions, potential benefits and harms, risks, costs, and cost-effectiveness; and
- A brief analysis of the types of issues that might affect the applicability of the evidence to the local context.

It is important to note that, unlike our other decision-support product, the *'Evidence in Context'* report, a *Rapid Evidence Report* is **not** a comprehensive and systematic synthesis of the literature on the topic. The rapid report provides neither critical appraisal of included articles nor a full analysis of the contextual issues involved in applying evidence to the Newfoundland and Labrador healthcare setting. Rather, a *Rapid Evidence Report* provides decision makers with a summary of the scope and nature of the recent scientific literature on the topic in question, an initial assessment of the strengths and gaps in this literature, and a review of the key points of agreement and disagreement among researchers.

Researchers and Consultants

For this report, the researchers from the Newfoundland and Labrador Centre for Applied Health Research were Melissa Sullivan, Research Officer, Contextualized Health Research Synthesis Program (CHRSP) and Dr. Stephen Bornstein, Director of NLCAHR. Our team consulted with Dr. Josephine McMurray, a professor and researcher at Wilfrid Laurier University with research expertise on digital methods for capturing patient experience. Dr. McMurray's credentials are summarized in Appendix A of this report.

Background

Patient experience has become an increasingly important component in the assessment of healthcare systems worldwide. The measurement of patient experience is important because it provides an opportunity to establish benchmarks and to monitor the performance of health care organizations, to improve care, to enhance strategic decision making, to pay attention to patients' expectations and to make healthcare organizations more transparent and accountable to their local populations (1-3). A recent systematic review by Doyle et al. that summarized evidence from 55 studies in primary care and hospitals found consistently positive associations between reported patient experience, patient safety, and clinical effectiveness for a wide range of disease areas, settings, outcome measures and study designs (4). These findings support the case for the inclusion of patient experience as one of the central dimensions of quality management in healthcare.

There are many approaches for collecting feedback from patients about their experiences with healthcare. Examples of quantitative approaches include: postal surveys; telephone surveys; automated telephone surveys; online surveys; surveys using hand-held portable devices; surveys using touch-screen kiosks (real-time surveys); and surveys using bedside media consoles. Qualitative approaches utilized to purposively capture patients' experiences include: in-depth interviews; focus groups; gathering of complaints/compliments; patient forums; and invitations to place comments on institutional websites. With the evolution of modern technology, digital applications, such as web-based surveys and touchscreen kiosks are increasingly being used to measure patient experience (5,6). Informal, unstructured patient experience data harvested from sources such as social media, blogs, and review sites are increasingly being mined through novel techniques such as natural-language processing and sentiment analysis (7-10).

One confounding issue in the development of valid and reliable measures of patient experience is the ambiguity in defining 'patient satisfaction' and 'patient experience' (11). The terms 'satisfaction' and 'experience' are often used interchangeably, yet they actually have different meanings (12). Patient satisfaction is the gap between patient experiences and expectations. Patient experience measures what happens during the course of receiving health care, including objective facts, subjective views, and the extent to which

patient needs were met. Questions relating to patient experience are, therefore, designed to capture what actually occurred during a health care visit (11, 12). Asking about patient satisfaction can produce feedback that is subjective in its depiction of reality. Asking about patient experience can be more helpful in pinpointing areas for improvement (11). There is evidence of strong associations among patient experience, patient safety, and clinical efficacy. This evidence suggests that monitoring patient experience can be a useful tool to support quality improvement by service providers (4).

Patient experience surveys are widely used in the hospital sector in Canada. Some provinces have legislation that requires the completion of annual patient surveys. For example, Ontario's Excellent Care for All Act (2010) has established a legislative requirement for healthcare providers in hospitals and in long-term care homes (as well as for some community care and primary care providers) to measure patient experience as part of their annual commitment to quality improvement (13).

Patient experience surveys are also becoming an essential part of Canadian accreditation requirements. As of January 2016, Accreditation Canada's client experience requirement applies to the following services: acute care; long term care; home care; home support; primary care; inpatient, outpatient, and community mental health; medical imaging centres; correctional services; and the Canadian Forces health system. As of 2017, client experience reporting will also be required for inpatient and/or outpatient cancer care and for residential homes providing care for seniors. By 2018, all organizations that provide direct service to clients will be expected to measure client experience and to demonstrate that action has been taken on any negative survey results (14,15).

Recognizing the importance of patient feedback and the growing use of digital approaches, our health system partners in the Contextualized Health Research Synthesis Program (CHRSP) asked us to review the evidence and produce a *Rapid Evidence Report* on the effectiveness of digital surveys in capturing patient experience. The request for this study was submitted by Central Health and was endorsed by consensus among the CHRSP partners.

Our research question is as follows:

"Are digital surveys an effective method for collecting patient feedback about experiences with the healthcare system?"

Scope and Nature of the Scientific Literature

For this *Rapid Evidence Report*, we sought systematic reviews and primary studies published in English between May 2011 and May 2016. We searched PubMed, CINAHL, PsycINFO, and the Cochrane Collaboration databases for studies on patient feedback methodologies. We conducted a further hand search in relevant journals including *Patient Experience Journal* and the *Journal of Medical Internet Research*. In addition, we searched Google, Google Scholar and the websites of research organizations with a patient engagement focus (e.g., the Canadian Foundation for Health Care Improvement, the Beryl Institute, and the Picker Institute) to locate relevant studies, literature reviews and evidence scans. We also screened the reference lists of selected articles to identify additional studies for inclusion. We had hoped to focus on systematic reviews but found that most of the relevant evidence was in primary studies of various kinds.

Our search terms included combinations of recognized terms, such as: patient feedback, patient experience(s), patient perspective(s), patient satisfaction, patient preference(s), patient centered care, survey(s), questionnaire(s), instrument(s), digital, electronic, web-based, evidence, utility, assessment, best method(s), effectiveness reliability, validity, measure, measurement and measuring.

Our search identified 750 articles in PubMed, 435 in PsycINFO and 107 in CINHAL. After careful assessment, our review was narrowed down to include three systematic reviews, twenty primary studies (eight comparative studies and twelve articles on best practices in patient feedback), two non-systematic literature reviews, one evidence scan and four guides on best methods for collecting patient experience data.

Of the eight comparative studies:

- six compared web-based surveys to paper-based surveys (16-21);
- one compared tablet surveys to web-based surveys and paper surveys (5); and
- one compared telephone surveys to web-based surveys (22).

In their systematic review of patient experience surveys, Beattie et al. organized their evidence into five main categories using the survey utility index coined by Van der Vleuten (1,12,23):

- validity,
- reliability,
- cost-efficiency,
- acceptability, and
- educational impact.

Our health system leader and our subject matter expert agreed that we should organize the following synthesis using these categorical headings.

The Validity of Surveys

Validity refers to question design accuracy and to the degree to which a survey measures what it is intended to measure. Before collecting patient feedback, it is important to be clear about the purpose of the feedback and about how it will be used (1,24,25). To ensure that survey questions are valid, understood and appropriate, the questions need to be developed and pre-tested with patients before being used (24). Some researchers recommend the exclusive use of items that have been taken from established, validated surveys, while others maintain that it is important to tailor surveys to the local context (25). In any event, the questions posed on surveys should aim to achieve:

- content validity (the extent to which a scale or survey measures all the important concepts associated with the domain of interest);
- criterion validity (the measure's correlation with other measures of the domain of interest); and
- construct validity (the ability of the scale to accurately measure the domain of interest) (26).

Data Equivalence & Data Quality

In their Cochrane Review, Belisario et al. examined fourteen studies comparing the responses to self-administered surveys using mobile apps (computer programs designed to run on mobile devices, such as smart phones and tablet computers) to the responses to surveys using other methods. They concluded there were no significant differences in the mean overall scores for data equivalence between apps and other delivery modes and that all correlation coefficients exceeded the recommended thresholds for data equivalence. App surveys running on consumers' smart devices resulted in more complete records than postal surveys, and significantly more data entries than automated SMS (short message service) text messages that contained a link to a web-based survey. Adherence to the sampling protocol was also better with apps when compared to postal surveys, but no different from adherence using SMS-based surveys. There were no statistics on data accuracy or response rates (6).

We also located three primary studies that compared data completeness for different survey delivery modes. Zuidgeest, Mlikotic and Barentsz concluded that online surveys offer several advantages over paper-based surveys. Online surveys were found to result in more complete data, as applications were programmed to prevent patients from proceeding within a digital survey until all survey questions in the previous section had been answered ("forced-answer technology"). The online surveys had interactive features with built-in skip logic (participants were asked only questions relevant to them). Furthermore, the automatic upload of responses into online databases eliminated the human data entry error

that is a common problem with paper-based surveys, thereby increasing the data quality and the validity of online surveys (5,16,17).

Open-ended questions allow people to provide responses using their own words. Corner et al., in their study of open-ended comments (qualitative responses) to an established cancer-care survey in England, found that open-ended comments helped to illuminate relationships between patients' experiences with care, their clinical outcomes, and their quality of life. Eight out of ten departmental management teams said that they found the open-ended feedback useful. The authors concluded that it was important to include space for qualitative feedback alongside quantitative questions in surveys about patient experience. The most-satisfied and the least-satisfied patients were most likely to comment (27).

Summary: Factors that Affect the Validity of Surveys

In summary, we found limited evidence comparing the validity of digital surveys to other survey modes. There appears to be consensus in the literature that digital surveys result in more complete data, data equivalency, and in the elimination of the requirement for human data entry in comparison with paper-based surveys. However, both the Cochrane Review by Belisario et al. and a recent evidence scan by deSilva conclude that there is not enough evidence to draw conclusions on the validity of digital versus other survey approaches (6,25). In addition, regardless of the methodology used, it was found that open-ended questions elucidate critical comments that cannot be obtained using purely quantitative surveys (28).

The Reliability of Surveys

Reliability refers to the ability of a research instrument to produce consistent and reproducible results with repeated measurements – that is, the ability of survey questions to elicit the same type of information each time they are used under the same conditions (1). A reliable survey method will help provide an accurate representation of patients' experiences and can reveal changes over time (24).

There is some evidence that inclusion of open-ended questions on digital surveys can help strengthen the reliability of research findings (29). Often, patients want to elaborate on their experiences; open-ended questions enable them to delve more deeply into issues that cannot be elicited from fixed-response choices and/or rating scales (25,28).

Sampling Bias

An often-described disadvantage of online surveys is sampling bias because different socio-demographic groups may be unlike in terms of access to the internet and proficiency in using online resources (18,30). Lagha et al. compared the responses to similar surveys that were administered online and by post. The postal cohort reported fewer negative

experiences than the online cohort. The online survey attracted a younger cohort of patients that seemed more willing to be critical. The researchers concluded that internet-based patient surveys may offer patients greater perceived anonymity and generate less reporting bias compared to paper-based postal surveys (31). A study by Rivara compared online survey responses to telephone interview responses and found that access to the internet was strongly associated with race, income, and education. The researchers found that if they had relied solely on a web-based survey, they would have excluded many participants from various disadvantaged population segments (low-incomes, less educated, rural, and minorities) and this would have resulted in a sample that was less representative of the overall population (22).

Response Rates

In the literature we reviewed, there was a consensus that the mode of delivery can affect response rates and the type of responses provided to a survey, and therefore the reliability of its results (i.e. measurement error). This issue can present itself as differences in estimates, recall effects, response order effects, social desirability bias, acquiescence or extremeness bias (6).

Low response rates to surveys can increase the potential for bias and can negatively affect the reliability of research findings. Combining a web-based survey with a traditional paper follow-up survey (mixed-mode survey) has been shown to increase response rates (5,16-19,22). Bergeson et al. found that awareness campaigns with posters in clinics informing patients about the web-based survey helped to encourage participation (21). Martino et al. found that a one-page letter, signed by the chief medical officer, emphasizing the purpose of the online survey and how the responses would be used, also increased the response rate (32).

Eight of the primary studies we examined compared response rates for digital surveys to those for other survey modes. As can be seen in Table 1, response rates for online surveys were sometimes lower and sometimes higher than for postal surveys or for telephone surveys. Adding the option of a paper version to a digital survey tended to increase response rates considerably when compared to using the digital survey exclusively.

Table 1: Response Rates by Survey Mode

Authors	Comparators	Response Rates
Bergeson et al.	web vs. postal surveys	• web survey: 14% • postal survey: 33% • < 5% of e-mails “bounced” or were undelivered • about 80% of e-mails with links to the survey were never opened

Authors	Comparators	Response Rates
Barentsz et al.	electronic (tablet and web surveys) vs. paper-based surveys	• electronic survey: 35.3% • paper-based survey: 64.7%
Mlikotic et al.	web vs. postal vs. phone surveys	• web-based survey: 35.40% • postal survey response rate: 42.7% • telephone survey: 12.33%
Van den Berg et al.	mixed invitation: web survey vs. invitation with opportunity to participate via paper or web survey	• mixed invitation group: 66% • web-only invitation group: 59% • mixed-invitation group: significantly more respondents filled out the paper-based survey (83%) compared with the web-only invitation group (65%), *P* = .01
Horevoorts et al.	web vs. paper-based surveys	• web survey response rate was significantly higher in paper optional group (41.23%) compared to the paper-included group (12.7%), *P* < .001. • majority of online respondents responded after first invitation (95.33%), which was significantly higher than paper respondents (52.19%) *P* < .001
Greenlaw et al.	mixed-mode (web survey followed by paper survey) vs. web only vs. paper-based only surveys	• web only survey: 52% • postal only survey: 42% • mixed-mode administration: 60%
Zuidgeest et al.	mixed-mode survey (web survey with a paper survey reminder) vs. postal survey	• response rates did not differ significantly between postal (64.0%) and mixed-mode survey (60.5%) groups, *P* = .30
Rivara et al.	web survey vs. telephone interview	• web survey: 67.9 % • telephone interview: 32.1%

Sources: (5,16-22)

As can be seen in Table 1, four studies (Bergenson, Barentsz, Mlikotic and Van den Berg) found that response rates were lower for web-based surveys than for paper-based surveys. In order to obtain more representative samples and higher reliability, it is therefore advisable to allow patients the option to complete a survey in whichever mode they prefer. In addition to finding higher response rates for mixed-mode surveys, Greenlaw and Zuidgeest both found that they produced more representative participation, more complete survey findings, and greater cost efficiency (16,20). Van den Berg et al. evaluated whether sending a mixed invitation (paper-based together with web-based survey) compared to a web-only invitation (web-based survey only) resulted in higher response rates. The mixed invitation group had a higher response rate than the web-only invitation group. They

concluded that response rates were enhanced by employing a mixed-mode strategy that enabled patients to fill out either a web-based or a paper-based survey (19). The literature, therefore, suggests that in order to increase response rates and to overcome the possible exclusion of some demographic groups, conducting a mixed-mode (web and postal) survey is preferable to conducting a web-based survey alone (20).

The Timing of Surveys

Newer digital technologies, such as hand-held devices and touch screen kiosks, are increasingly being used to collect real-time patient experience data (25). The time span required to complete a digital survey is much shorter than traditional paper-based methods. Because information can be gathered automatically there is no need to wait for paper surveys to be returned by mail, response time is almost instant, and data analysis can be faster (33). Belisario et al., in their Cochrane review of fourteen studies, compared mobile app surveys to other modes. They found that while the delivery of digital surveys via smartphones apps or tablets can maximize the speed of data collection and may result in more complete datasets, there is not enough evidence about whether this increase in speed has an impact on the reliability of survey responses(6).

One important methodological challenge to the reliability of surveys relates to the length of time it takes for a patient to receive a survey after a healthcare encounter (34). Surveys can be distributed immediately after a healthcare encounter (real-time feedback), a short time after the encounter, a long time after the encounter (post-treatment feedback), or through regular monitoring (continuous feedback) (33,34). The longer the gap in time, the more likely it is that patient recall may be negatively affected and this can lead to measurement error (34). However, administering a survey too soon after treatment may not be advisable either, especially after an emotionally or physically burdensome encounter such as surgery (25).

Bjertnaes et al. investigated the association between survey timing and patient-reported experiences. They found that patients report more negative experiences when their experiences are measured a longer time after a clinical encounter. To reduce the potential for measurement error (i.e., recall error), this study recommended that researchers take advantage of the short timespan required to launch a digital survey and to survey patients as soon as possible after a clinical encounter (34).

Summary: Factors that Affect the Reliability of Surveys

In summary, there is consensus in the literature that the mode of delivery can affect response rates and the quality of the responses provided in a survey. Digital surveys have been found to have more complete responses and lower response rates than paper-based experience surveys. Higher response rates and more representative participation have been achieved through mixed-mode surveys. Digital surveys can increase reliability by allowing for a shorter time lapse between the clinical encounter and completion of a survey. In

addition, the reliability of digital surveys can be increased by combining fixed-choice responses with open-ended questions.

The Cost-Efficiency of Surveys

Digital surveys can be considerably more cost-efficient than postal surveys (20). When selecting a mode of survey administration, decision-makers may wish to take into account the availability of funds and the anticipated staff resources required to carry out the survey. The resources required to conduct a paper-based survey can be considerable; the manual entry of responses is time-consuming; manual entry can also introduce the risk of transcription error (20). Decision makers may also wish to consider the costs that can arise from adverse health outcomes that have been associated with certain digital approaches. For example, when using in-clinic shared kiosks or electronic devices to collect feedback within a healthcare setting, safety and hygiene need to be considered to offset the risk of infection among multiple users. Off-the-shelf devices may also be unsuitable because they can be difficult to clean and can present infection-control challenges (25).

We identified three peer-reviewed primary studies that examined the cost-efficiency of postal, web-based and/or mixed-mode patient experience surveys. We were unable to identify any studies that examined the cost-efficiency of newer digital technologies, such as tablets and kiosks located on-site (real-time feedback) or mobile apps for smart phones. The studies we reviewed suggest that web-based surveys cost less to administer than postal surveys (16,20,21,35).

Two of the studies we reviewed examined whether a mixed-mode survey (internet survey with a mailed paper follow-up reminder) was more cost-efficient than a traditional postal survey. In the Zuidgeest study, patients received a letter from their health insurance company with the request to fill out either a paper questionnaire (postal survey) or an internet survey with unique username and password (mixed-mode survey). A total of three reminders were sent. In both surveys, non-respondents received a paper version of the questionnaire in the third mail-out. Cost calculations involved the following expenses:

- setup costs (survey layout, programming and testing of each survey, and mailing supplies);
- field costs (postage, technical support, and project management staff); and
- data entry.

Combining an internet survey with a paper follow-up reminder resulted in the same response rate as a postal survey but at a lower cost per valid questionnaire returned (16). Greenlaw et al. also found that mixed-mode surveys were less costly than paper-based surveys alone. They noted various human resource savings with online surveys: survey

administrators were able to send and track reminders more efficiently and less time was required for data entry (20).

In their study comparing web-based to postal survey data collection, Bergeson et al. found that web-based surveys obtained patient feedback more quickly and were less expensive than postal surveys. Once the one-time setup cost was incurred, an unlimited number of patients could be surveyed and reminders sent electronically without incremental costs. The web-based surveys were considered complete at four weeks from date of service, whereby the mailed surveys could be considered complete only at about eight weeks (21).

Summary: Factors that Affect the Cost-Efficiency of Surveys

In summary, the costs associated with conducting a survey vary by mode of administration. Web-based surveys offer several cost advantages compared to traditional paper-based surveys. The human resources required to conduct a web-based survey are fewer. The need for the time-consuming manual entry of responses is avoided as digital survey data can be automatically captured in a database. This helps to minimize transcription error and to ensure greater accuracy of data. Data analysis is also made easier. Moreover, a digital survey can be launched in less time than a postal survey. Mixed-mode surveys have been proven to be more cost-efficient that paper-based surveys alone even though they are somewhat more costly than purely digital approaches.

For more detail on survey cost-efficiency, Appendices B and C of this report contain tables that show cost comparisons for commonly-used quantitative and qualitative methods to collect patient experience data and input.

The Acceptability of Surveys

Acceptability refers to the suitability of a research instrument from the users' perspective (12). In order to maximize response rates and to have an adequate sample size, the length of the instrument, its readability (coherence) and its mode of administration all need to be taken into account (12). As Beattie et al. conclude in their systematic review of instruments measuring patient experience, survey instruments must be acceptable and interpretable to both the patients and the end users of the research findings (1). We found seven peer-reviewed primary studies that examined the acceptability of digital surveys from a socio-demographic perspective. There was a consensus that relying on digital surveys alone to collect patient experience data can lead to biased survey results in which some socio-demographic groups are over-represented (such as the young and/or the more highly educated).

Socio-demographic Factors

Seven studies (Bergeson, Horevoorts, Barentsz, Mlikotic, van den Berg, Zuidgeest and Rivara) all found that younger participants and those with higher levels of education and/or income were more likely to respond to digital surveys than to postal surveys (5,16-19,21,22). Rivara et al. also found that web-based surveys tended to under-represent rural and minority populations resulting in a sample that was not always representative of the population. Table 2 shows a summary of the sociodemographic findings by survey mode for these seven primary studies. The so-called "grey digital divide" is a common finding in these studies. In order for a patient to be able to complete a web-based survey, he/she must be able to use a computer and be skilled in navigating the internet. It is, therefore, not surprising that these studies all suggest that patients should be provided with the opportunity to complete a survey in a mode that is "acceptable" to them (in either digital or paper format).

Table 2: Socio-demographic Characteristics & Digital Surveys

Authors	Comparators	Sociodemographic Findings
Bergeson et al.	web vs. postal surveys	• females and younger patients were more likely to respond to a web-based survey • males and those ≥ 65 years of age were more likely to complete a postal survey
Horevoorts et al.	web vs. paper-based surveys	• ≥70 years of age preferred paper-based survey (71.0%) • 18.2% of those ≥ 80 years completed web-based survey
Barentsz et al.	electronic (tablet and web surveys) vs. paper-based surveys	• patients choosing electronic questionnaires were significantly younger (mean 47.3 years vs mean 53.5 in the paper group, *P*=.01) and more highly educated (*P*=.004) data were only compared for electronic to paper-based surveys (did not breakdown data by tablet and web survey)
Mlikotic et al.	web vs. postal vs. phone surveys	• average age of participants who responded via the web-based platform (52.9 years, 95% confidence interval [CI] 52.1-53.7) was significantly lower than those who used mail and telephone methods (55.9 years, 95% CI 55.2-56.5; *P*<.001) • with each decade of increased age there was a 0.97-fold decrease in the odds of a patient participating in the web-based survey compared to other survey methods (odds ratio [OR] 0.97, P<.001) • web-based participation was more likely for those who completed higher levels of education • with each interval increase in education level (e.g. intervals ranging from grade 9 or less to university degree) there was a 1.83-fold increase in the odds of the website platform being used (OR 1.83, P<.001)

Authors	Comparators	Sociodemographic Findings
Van den Berg et al.	mixed invitation: web survey vs. invitation with opportunity to participate via paper or web survey	• patients who filled out the web-based version of the questionnaire had a higher educational level than those who filled out the paper-based version (*P*= .01)
Zuidgeest et al.	mixed-mode survey: internet survey with a paper follow-up reminder vs. postal survey	• patients who filled out the questionnaire online were significantly younger (*P* < .001), were more highly educated (*P* = .002), and reported better psychological health (*P*= .02) than respondents who filled out the paper questionnaire
Rivara et al.	web vs. telephone surveys	• exclusive use of the web survey would have excluded a large proportion of low-income, less-educated, rural, and minority patients and would have resulted in a sample that was not representative of the population

Sources: (5,16-19,21,22)

Summary: Factors that Affect the Acceptability of Surveys

In summary, while digital surveys offer several advantages to paper-based surveys, relying on digital surveys alone could lead to a biased sample. It has been found that younger participants and those with higher levels of education and income prefer digital surveys. In order to avoid the exclusion of some demographic groups, such as older adults, consideration should be given to offering patients the choice of completing a survey in the mode they prefer.

The Educational Impact of Suveys

While collecting patient experience data through robust and appropriate methods is important, it is only part of the work necessary for evaluating patient experience. The educational impact of a research instrument refers to the ability of the instrument to capture results that can be readily used for action, when necessary (12,14).

We found two studies that evaluated the educational impact of patient feedback mechanisms; several guides also make reference to its importance. However, none of the studies we reviewed differentiated between digital surveys and other approaches.

Acting on Survey Findings

A study by Robert et al. found that, regardless of the survey mode used, healthcare organizations often find it challenging to apply what they have learned from patient experience surveys (36). Turning feedback into action requires usable data as well as interpretive competency and knowledge-translation skills. As Beattie et al. point out, it is important for the staff responsible for analysis to have advanced skills in how to analyze and interpret the results. This will help ensure that the feedback collected is useful (12). Using data collected through patient experience surveys requires that organizations have the capacity to collate, track, analyze, interpret and take action on the data collected (25). Studies in several countries suggest that healthcare managers and clinicians often struggle to link patient experience data to local improvement initiatives (24,37). Robert et al. found that appointing a champion or leader on patient experience resulted in a significant improvement in the quality of patient experience research and in the ability of organizations to act on the results (36).

Dissemination / Communications Planning

There is little evidence on how to best use and disseminate patient experience findings (38). Robert et al. determined that an organization's dissemination strategy is one of the most important components of the patient feedback process. They found that patient experience survey data are more effective when the findings are disseminated in tandem with educational programs or quality improvement guidance. Providing survey results to patients and members of the public was just as important as providing it to staff. They concluded that data from surveys should be examined alongside other patient experience data, such as, complaints, suggestions for improvement, and incident reports, in order to get a more complete picture (36).

Reeves et al. conducted interviews with 24 hospital staff involved in quality-improvement initiatives in the UK. They sought to identify drivers and barriers experienced in using survey results. Barriers included:

- a lack of data specific to smaller units within healthcare facilities;
- delays in disseminating findings;
- a limited understanding of statistical methods;
- lack of time to discuss the results;
- the low priority given to using survey results; and
- skepticism among clinicians about the validity of the surveys.

A number of factors were identified as being important factors in the success of survey programs, including:

- making the results available and specific to smaller units;
- strengthening the profile of survey results in performance measurement; and
- facilitating networking for those involved in surveys (3).

Robert et al. found that 'feeding back' patient experience survey results was a key component of demonstrating the value of the national survey program in the UK (36). Often the "you said, we did" aspect is missing from what healthcare organizations report to the public (39). It is important to let patients know how the feedback they provided in a survey was used and what actions were taken as a result. In the UK, well-designed posters displayed in highly visibly places in healthcare facilities helped demonstrate how patients' experiences were being taken seriously and had resulted in quality-improvement measures (36,39).

Summary: Factors that Affect the Educational Impact of Surveys

In summary, regardless of the survey mode, healthcare organizations often find it difficult to apply what they have learned from patient experience surveys. Turning feedback into action requires data that can be analyzed, interpreted and shared with patients and staff. Using data collected through patient experience surveys requires organizations to allocate the appropriate resources to collate, track, analyze, interpret and take action on patient experience data. Informing patients about how their feedback will be used and the end results of their contribution is also important. Posters displayed in high-traffic areas within healthcare facilities can help show how patients' experiences were taken seriously, valued and acted upon.

Potentially Relevant Contextual Issues

In our examination of the evidence, we also sought to identify factors unique to Newfoundland and Labrador that might influence the relevance of the findings in the context of our provincial healthcare system.

Aging Population, Literacy and Internet Usage

The population of Newfoundland and Labrador is aging quickly and has comparatively low levels of literacy. Over the past 30 years, the province's population has aged faster than any other province in the country. According to Statistics Canada, as of September 29, 2015, 18.4% of the population were aged 65 years or older. By 2026 it is projected that 26% of the population will be age 65 years or older (40).

In 2012, 56.8% of the Newfoundland and Labrador population aged 16 to 65 had literacy scores below Level 3 (high school completion); this is far lower than the Canadian average of 43.2% (41).

While internet usage among adults continues to grow in the province, there has been a low uptake of digital technologies by older adults. Among those aged 65 and older in this province, internet usage was reported by Statistics Canada to be at 41.1% in 2012; while the

national average was 47.5% (42). A similar difference was found in the rate for the second lowest age group (45 to 64).

Table 3: Canadian Internet Use Survey, Internet Use by Age Group, Newfoundland and Labrador, Canada, 2010 and 2012

	NL 2010	Canada 2010		NL 2012	Canada 2012
16 to 24 years	100.0%	97.5%		100.0%	98.6%
25 to 44 years	90.2%	93.0%		94.0%	95.5%
45 to 64 years	72.5%	80.1%		74.4%	83.8%
≥ 65 years	23.9%	40.2%		41.1%	47.5%
≥ 16 years	72.9%	80.3%		76.9%	83.4%

Source: Statistics Canada, Canadian Internet Use Survey, CANSIM Table 358-0152

In order to reduce the possible exclusion of the elderly, the less-educated and those without internet access or with unreliable internet access, a mixed-mode survey (digital and postal survey) can help ensure a higher response rate and a more representative, less biased survey sample. For respondents with low literacy levels, telephone interviews are recommended. For respondents with low access to, or adoption of, digital technologies (internet, tablet or smartphone), offering a paper alternative is more suitable. Offering a mixed-mode survey may cut into some of the advantages to be gained from administering digital surveys alone (e.g., automatic data entry; rapid turnaround of results); however, the mixed-mode approach can partially retain these advantages since some older respondents and those with lower literacy may still choose the digital format.

Rural Communities and Digital Technology Access

Digital surveys require internet access. Persons in rural communities without access to the internet or with slow or inconsistent network services may be unintentionally excluded from participating in digital patient experience surveys. In order to ensure equal access to digital surveys, people living in rural areas will need to be given the option to participate in surveys using other methods such as paper-based surveys or telephone interviews. If real-time feedback is collected through hand-held devices or kiosks at healthcare facilities, technology infrastructure (support personnel, robust Wi-Fi signals) will be necessary to ensure that the surveys are functional at all times.

Administrative Considerations

The healthcare system in Newfoundland and Labrador is under heavy pressure to cut costs (even more so than many other provinces). Monitoring patient experience can help minimize the potential impact of cost-cutting on the quality of care. Patient experience surveys are becoming an important part of the evaluation of the Canadian healthcare system. By 2018, Accreditation Canada will require organizations that provide direct service to clients to measure patient experiences, and to show how action has been taken on

negative data. Turning feedback into action requires that staff involved in the design of patient experience surveys have a strong background in health research methodology, data analytics, patient engagement and knowledge transfer. Healthcare organizations in Newfoundland and Labrador will need to ensure they have appropriately-trained staff in place to collect patient experience data using valid and reliable instruments, in a cost-efficient and acceptable manner with the capability to capture data that is usable and can be readily acted upon as necessary. According to the evidence in this review, the use of digital patient experience survey methods appears to be a sensible way to do this, provided that health system administrators take precautions to avoid heavily-biased samples.

Summary of Key Points

The literature we have reviewed finds digital surveys to be as valid, reliable, cost-efficient and acceptable as paper-based surveys, and to have a number of advantages. However, certain precautions need to be taken into account in order to avoid or minimize some of the drawbacks commonly associated with digital surveys. Below we list a summary of key points for consideration:

- The literature suggests that the advantages of digital surveys over paper-based surveys are: time savings, automatic data entry, rapid turnaround of results, and lower costs.

- The benefits noted above should be balanced against the identified weaknesses of digital surveys, namely: lower response rates and the risk of sample bias resulting from a lack of accessibility to digital surveys by some survey participants for whom paper surveys would be more feasible.

- Digital survey data can be captured automatically and downloaded quickly without transcription error thereby saving time, reducing costs, and maximizing data accuracy.

- Digital surveys tend to produce more complete responses but can have lower response rates than postal surveys.

- The exclusive use of digital surveys may not be acceptable to all patients. Mixed-mode surveys can help overcome the possible exclusion of older adults, people with lower education levels, the poor, and those without reliable internet access. Mixed-mode surveys have also been shown to result in higher response rates and more representative, less-biased samples.

- Awareness campaigns with posters informing patients of surveys and how the survey results will be used have been shown to increase response rates.

- As with paper surveys, digital surveys need to be designed well to be usable in real-world practice. Research and guidelines for best practices in the collection of patient feedback often recommend the inclusion of patients in the design and pre-testing of surveys. Involving patients directly in the survey design can help ensure that survey questions are valid and reliable. Survey design guidelines also suggest that questions focus on what patients have actually experienced, as opposed to asking for opinions about their experiences (satisfaction measures). The inclusion of fixed rating scales together with open-ended questions have been shown to increase data quality and to provide valuable insight for decision makers. An appropriate survey length and its overall coherence (readability) can help ensure maximum returns and an adequate sample size.

- The literature indicates that healthcare organizations often find it difficult to apply what they have learned from patient experience surveys; however, using the information collected from digital patient experience surveys is at least as important as the collection of high-quality data. Turning feedback into action requires usable data, interpretive competency, and knowledge-translation skills. Data collected through patient experience surveys requires organizations to have the capacity to collate, track, analyze, interpret, and take action on patient experience data.

For more detail about survey design, Appendices B and C of this report contain an overview of the advantages and disadvantages of different quantitative and qualitative survey methods for soliciting patient experience data and input.

Articles Included in this Review

(1) Beattie M, Murphy DJ, Atherton I, Lauder W. Instruments to measure patient experience of healthcare quality in hospitals: a systematic review. Syst Rev 2015 Jul 23;4:97-015-0089-0.

(2) Tsianakas V, Maben J, Wiseman T, Robert G, Richardson A, Madden P, et al. Using patients' experiences to identify priorities for quality improvement in breast cancer care: patient narratives, surveys or both? BMC Health Serv.Res. 2012;12(271).

(3) Reeves R. Do patient surveys work? The influence of a national survey programme on local quality-improvement initiatives. Qual Safe Health Care BMJ 2008;17:437-441.

(4) Doyle C, Lennox L, Bell D. A systematic review of evidence on the links between patient experience and clinical safety and effectiveness. BMJ Open 2013 Jan 3;3(1):10.1136/bmjopen-2012-001570.

(5) Barentsz M, Wessels H, van Diest P, Pijnappel M, Haaring C, van der Pol C, et al. Tablet, Web-Based, or Paper Questionnaires for Measuring Anxiety in Patients Suspected of Breast Cancer: Patients' Preferences and Quality of Collected Data. . J Med Internet Res 2014;16(10):e239.

(6) Belisario J, Jamsek J, Huckvale K, O'Donoghue J, Morrison C, Car. J. Comparison of self-administered survey questionnaire responses collected using mobile apps versus other methods (Review). 2015.

(7) Lupton D. The commodification of patient opinion: The digital patient experience economy in the age of big data. Sydney Health and Society Working Group 2013;3.

(8) Grey K, Rafferty M. Beyond patient experience surveys: Leveraging social media to glean patient feedback. Nurse Leader 2014;12(3).

(9) Greaves F, Ramirez-Cano D, Millet C, Darzi A, Donaldson L. Harnessing the cloud of patient experience: using social media to detect poor quality healthcare. BMJ Qual Saf 2013;22(3).

(10) Greaves F, Ramirez-Cano D, Millett C, Darzi A, Donaldson L. Use of sentiment analysis for capturing patient experience from free-text comments posted online. J.Med.Internet Res. 2013;15(11).

(11) McMurray J, McNeill H, Lafortune C, Black S, Prorok J, Stolee P. Measuring patients' experience of rehabilitation services across the care continuum. Part I: A systematic

review of the literature. Archives of Physical Medicine and Rehabilitation 2016;97:104-20.

(12) Beattie M, Lauder W, Atherton I, Murphy D. Instruments to measure patient experience of health care quality in hospitals: A systematic review protocol. Systematic Reviews 2014;3(4):1-8.

(13) Ontario Ministry of Health and Long-Term Care. About the Excellence of Care for All Act. 2010.

(14) Accreditation Canada. Client Experience Guide. 2016.

(15) Interview with Laura Gordon of Accreditation Canada. 2016.

(16) Zuidgeest M, Hendriks M, Koopman L, Spreeuwenberg P, Rademakers J. A comparison of a postal survey and mixed-mode survey using a questionnaire on patients' experiences with breast care. J Med Internet Res 2011;13(3):e68.

(17) Mlikotic R, Parker B, Rajapakshe R. assessing the effects of participant preference and demographics in the usage of web-based survey questionnaires by women attending screening mammography in British Columbia. J Med Internet Res 2016;18(3):e70.

(18) Horevoorts N, Vissers P, Mols F, Thong M, van de Poll-Franse L. Response rates for patient-reported outcomes using web-based versus paper questionnaires: Comparison of two invitational methods in older colorectal cancer patients. J Med Internet Res 2015;17(5):e111.

(19) van den Berg M, Overbeek A, van der Pal H, Versluys A, Bresters D, van Leeuwen F, et al. Using web-based and paper-based questionnaires for collecting data on fertility issues among female childhood cancer survivors: Differences in response characteristics. J Med Internet Res 2011;13(3):e76.

(20) Greenlaw C, Brown-Welty S. A comparison of web-based and paper-based survey methods testing assumptions of survey mode and response cost. Evaluation Review 2009;33(5):464-80.

(21) Bergeson S, Gray. J., Ehrmantraut L, Laibson T, Hays R. Comparing web-based mail survey administration of the Consumer Assessment of Healthcare Providers and Systems (CAHPS) clinician and group survey. Prim Health Care 2013;3.

(22) Rivara FP, Koepsell TD, Wang J, Durbin D, Jaffe KM, Vavilala M, et al. Comparison of telephone with world wide web-based responses by parents and teens to a follow-up survey after injury. Health Serv Res 2011 06;46(3):964-981.

(23) Van der Vleuten C. The assessment of professional competence developments, research and practical implications. Adv in Health Sci Educ. 1996;1:153-7.

(24) Picker Institute. Guide - Using Patient Feedback. 2009.

(25) de Silva D. Evidence Scan - Measuring patient experience. 2013.

(26) Streiner D, Norman G. Health measurement scales: A practical guide to their development and use. 4th ed. ed. Oxford, UK: Oxford University Press; 2008.

(27) Corner J, Wagland R, Glaser A, Richards M. Qualitative analysis of patients' feedback from PROMs survey of cancer patients in England. BMJ open 2013;3(4).

(28) Riiskjær, E., Ammentorp, J., Kofoed, P. The value of open-ended questions in surveys on patient experience: number of comments and perceived usefulness from a hospital perspective. International Journal for Quality in Health Care 2012;24(5):509-16.

(29) Fritz F, Balhorn S, Riek M, Breil B, Dugas M. Qualitative and quantitative evaluation of EHR-integrated mobile patient questionnaires regarding usability and cost-efficiency. Int. J. of Medical Informatics 2013;81:303-313.

(30) LaVela S, Gallan A. Evaluation and measurement of patient experience. Patient Experience Journal 2014;1(1):28-36.

(31) Lagha E, Noble A, Smith A, Denvir M, Leslie S. Patient Reported Experience Measures (PREMS) in chronic heart failure. Journal of the Royal College of Physicians and Surgeons Edinburgh 2012;42:301-5.

(32) Martino K, Elliott M, Teleki S, Hays R. A field experiment on the impact of physician-level performance data on consumers' choice of physician. Medical Care 50 Suppl 2012:S65-73.

(33) Coulter A, Fitzpatrick R, Cromwell J. Measures of Patients' Experience in Hospital: Purpose, Methods and Uses. 2009.

(34) Bjertnaes O, Sjetne I, Iversen H. Overall patient satisfaction with hospitals: Effects of patient-reported experiences and fulfilment of expectations. . BMJ Qual Saf 2012;21(1):39-46.

(35) McPeake J, Bateson M, O'Neill A. Electronic surveys: how to maximise success. . Nurse Researcher 2014;21(3):24-26.

(36) Robert G, Cornell, J. Bearley, S.et al. "What matters to patients?" Developing the evidence base for measuring and improving patient experience. Project Report for the Department of Health and the NHS Institute for Innovation and Improvement. 2011.

(37) Baker G. Evidence boost: A review of research highlighting how patient engagement contributes to improved care. Canadian Foundation for Health Care Improvement 2014.

(38) Edwards K, Walker K, Duff J. Instruments to measure the inpatient hospital experience: A literature review. Patient Experience Journal 2015;2(2):77-85.

(39) University of Birmingham Health Services Management Centre and NHS West Midlands. A guide to capturing and using patient, public and service user feedback effectively. 2009.

(40) Government of Newfoundland and Labrador. Provincial Health Aging Policy Framework: Status Report. 2015.

(41) Government of Canada. Learning - adult literacy. 2012; Available at: http://well-being.esdc.gc.ca/misme-iowb/.3ndic.1t.4r@-eng.jsp?iid=31.

(42) Statistics Canada. Canadian internet use survey, internet use by age groups, Newfoundland and Labrador, Canada, 2010 and 2012. 2012; Available at: http://www5.statcan.gc.ca/cansim/a26?lang=eng&id=3580152.

Appendix A: About Our Consultant

Dr. Josephine McMurray, PhD, MBA, MRT

Josephine McMurray, PhD, MBA, MRT is an Assistant Professor in the Lazaridis School of Business & Economics at Wilfrid Laurier University, in the Business Technology Management & is a member of the Health Studies Faculty. Her research is focused on issues at the intersection of healthcare, technology & management. She is a member of the AGEWELL NCE, and leads the DRiVE project examining regional health innovation ecosystems that support the creation of technological solutions to support healthy aging. Other collaborative research includes work into system interoperability and shared decision making for medication management in large multidisciplinary health teams, development the WatLX™ survey tool to measure patient experience in the rehabilitative care sector, and smartphone technology for patient experience data collection. She is a member of a community hospital board, and has presented her research nationally and internationally at both industry and academic conferences.

Appendix B:

Comparison of Some Quantitative Research Methods Used to Collect Patient Experience Data

	Web Surveys	Hand-Held Device Surveys	Touch-Screen Kiosk Surveys	Postal Surveys
Cost	$	$$	$$	$$$
Skip Logic So Respondents are Asked Questions Only Relevant to Them	√	√	√	X
Can Include Open-Ended Questions	√	√	X	√
Surveys Can Be Fairly Long and Detailed (may lead to survey fatigue and low completion rates)	√	√	X	√
Automatic Data Entry	√	√	√	X
On Site Data Collection	X	√	√	X
Rapid Turnaround of Results	√	√	√	X
Suitable for Internal/External Benchmarking or Monitoring Trends	√	√	√	√
Must Take Into Account Differences in Screen Size, Operating Systems and Browsers	√	√	X	N/A
Suitable for Those with Low Literacy	X	X	X	X
Suitable for Those without Internet Access	X	X	√ (Done on site)	√
Suitable for Those Who are Not Familiar with Computers	X	X	X	√
Potential for Interviewer Bias	N/A	N/A	N/A	N/A

Appendix C:

Comparison of Some Qualitative Research Methods Used to Collect Patient Experience Input

	Face-to-face Interviews	Focus Groups	Complaints/ Compliments
Cost	$$$$	$$	$
Issues Can Be Examined In Detail and In Depth	√	√	√
Time Consuming	√	√	√
Automatic Data Entry	X	X	X
Rapid Turnaround of Results	X	X	√
Suitable for Internal/External Benchmarking or Monitoring Trends	X	X	√
More Detailed Responses Possible	√	√	√
Must Take Into Account Differences in Computer Systems and Browsers	N/A	N/A	N/A
Suitable for Those with Low Literacy	√	√	√
Suitable for Those without Internet Access	√	√	√
Suitable for Those Who are Not Familiar with Computers	√	√	√
Potential for Interviewer Bias	√ (Skilled Interviewers Necessary)	√ (Skilled Interviewers Necessary)	√