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Title: Measuring Patient Perception of Quality in a PET-CT center: Adapting a Standardized Industry Proven Tool.

Running foot line: Measuring patient perception of quality

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Abstract

Introduction

Patient satisfaction and perception of health care delivery is essential in contemporary health system. Our study quantitatively measures patient perception of quality and satisfaction in a PET-CT center at the point of care using a psychometrically validated questionnaire, SERVPERF, to guide subsequent quality improvement interventions. SERVPERF is a survey instrument that captures service quality by measuring performance of various services. It has demonstrated reliability and validity across various industries. The standard for measuring patient perception of quality in hospitals, the Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey does not include questions sensitive to the care received in a typical radiology department and is not obtained at the point of care.

Methods

429 patients receiving PET-CT examinations filled out an anonymous modified SERVPERF questionnaire upon completion of imaging and reported level of agreement with each of the 27 items by circling a Likert type scale from 1 – 7. Each of the items was designed to elicit response regarding patient perception of performance on a metric of quality. Data were summarized as mean of each item. Frequency of low scores (≤ 3) was also calculated.

Results

The items with the lowest mean score were “The department’s physical facilities are visually appealing” (6.158) and “Documentation such as sign-in sheet, handouts and brochure as visually appealing” (6.161). The item with the highest frequency of low scores (≤ 3) was, “The department provides services at the promised time” (11/429 responses).

Conclusion

Our study showed that patient perception of quality in a diagnostic radiology department can be measured with a standardized survey at the point of care delivery and used to direct patient centered quality improvement interventions.

Introduction

Despite technological advancements in healthcare, the quality of care provided by our current healthcare systems continues to be less than optimal *(1,2).* A fundamental challenge in assessing quality revolves around the subjective nature of the definition of quality. From which perspective is it defined, and to whom does it apply? Various definitions have been offered from multiple organizations. The US Agency for Healthcare Research and Quality (AHRQ) defines quality as "doing the right thing, at the right time, in the right way, for the right person and having the best possible result." *(3*). The Institute of Medicine (IOM) states quality is “the degree to which health services for individuals and populations increase the likelihood of desired health outcomes and are consistent with current professional knowledge.” *(1).* While these definitions capture the essence of quality in an ethereal manner, they are from the perspective of the system, and not necessarily patient-centric.

With more recent focus on patient centered care, the idea of quality is increasingly being shifted to the perspective of the patient. Traditionally in healthcare delivery, measures of quality were limited to clinical outcomes. Patient perception of quality is not limited to clinical outcomes, and is decided based on a holistic experience throughout the continuum of care (*4*). This is reflected in a more recent definition of quality by Davis et al, as “providing the care that the patient needs, in the manner the patient desires, at the time the patient desires” (*5*).

The need to focus on the patients’ whole experience is especially important in diagnostic radiology. When a patient goes to a diagnostic center for their imaging, there are few clinical outcomes to use as the basis for perception of quality or satisfaction with care. In this situation, it behooves the Radiologist to establish a systematic approach toward finding measurable data points which reflect patient

experience and in turn satisfaction. In the words of Peter Drucker, with respect to quality, “if you can’t measure it, you can’t manage it” (*6*).

Measurement of quality is an essential component of quality improvement because it helps to identify areas for improvement as well as monitor effectiveness and unintended results of quality improvement interventions (*2,7*). With the advancement in the validity and reliability of tools available to measure quality, it is imperative that quality improvement initiatives are guided by patient feedback and aimed at improving a patient’s overall experience (*8*). Industries outside of the healthcare realm are utilizing standardized surveys, such as SERVPERF, to measure costumer perception of quality in an effort to guide quality improvement interventions (*8-12*). These specific types of surveys could also be used in the healthcare arena to gauge patient perceptions of quality. The purpose of this study was to quantitatively measure patient perception of quality and satisfaction at the point of care in a diagnostic radiology center using a psychometrically validated questionnaire, SERVPERF, in order to guide subsequent quality improvement interventions.

Methods and Materials

Patient Selection

The institutional review board (IRB) approved this study and all subjects signed a written informed consent. Patients who had PET-CT examinations at a tertiary institutions’ PET Center from December 2014 through March 2015 were handed an anonymous survey upon completion of imaging. The study was limited to outpatients for logistical reasons including the fact that inpatients usually do not experience the full administrative spectrum of the experience of radiology departments such as registration and wait time.

Standardized Survey- SERVPERF

SERVPERF is a survey instrument created by Cronin and Taylor in 1992 that captures service quality by measuring performance of various services (*9*). This instrument, as a multidimensional or unidimensional scale, has demonstrated reliability and validity worldwide across various industries including healthcare, banking, transportation, telecommunication and higher education (*9-13*). It has demonstrated high reliability across industries including healthcare, banking, transportation, telecommunication and higher education with a Cronbach alpha, the estimate of the reliability of a psychometric test, ranging from 0.88 to 0.96 (*9-11*). Our questionnaire adapted the SERVPERF questionnaire, which contains 22 items (questions) to measure perception of quality. Each of the questions was designed to elicit response regarding patient perception of performance on a metric of quality. In addition, we created 5 questions directed at measuring patient satisfaction for a total of 27 items in our questionnaire [Table 1]. Patients reported varying levels of agreement or disagreement with each item by circling 1-7 on a Likert type scale with 7 being the highest level of agreement, and 1 the lowest. Our questionnaire included some non-identifiable demographic information and number of prior visits to the PET-CT center in the last year (0-3). Each of the 27 items was calculated individually with no summative score given.

Data Collection and Analysis

After receiving their imaging service, patients were returned to the waiting room by a radiology technologist, who then handed them the one page paper based survey to fill out. Patients filled out the survey and placed them into a locked drop box present in the waiting room. The drop box was emptied at the end of every day by a member of the study team. Each questionnaire was numbered and printed by one of the three members of the primary study team to track response rates and create a system of accountability among technologists handing them out.

The primary outcome was mean score for each of the 27 items in the questionnaire to identify responses with the lowest score. The items with the highest frequency of low scores were calculated. A low score was defined as ≤ 3. Data was then analyzed to assess patient perception of quality and satisfaction stratified based on number of visits (first visit vs multiple visits in the past year), gender, and age (treated as a binary predictor variable with age less than 50 years of age, and age greater than or equal to 50 years of age) utilizing two sample t-tests. All statistical analyses were performed using Stata 13 (StataCorp, College Station, TX).

Results

Frame work:

The analytic sample included 429 patients who filled out the survey, which was 65% of the patients that visited the PET center during the specified time frame. It included patients 15-86 years old (mean 56 years). 54% of responses were female and 24% were visiting the center for the first time in the past year.

Findings:

The items with the lowest mean score were question 4, "Documentation such as sign-in sheet, handouts and brochure as visually appealing" (mean 6.162) and question 2, "The department's physical facilities are visually appealing" (mean 6.158). Patient satisfaction with the front desk (mean 6.579) was lowest compared to satisfaction with technologists and physicians. The item with the highest frequency of lower scores (≤ 3) was question 9, "The department provides services at the promised time" (11/429 responses). Table 2 shows results by items. There was no statistical difference in patient perception of quality and satisfaction comparing first time visits to multiple prior visits in the past year for all items as

shown in table 3. There was also no difference in patient perception of quality and satisfaction between males and females for all items in the survey as seen in table 3. Perception of quality was lower for patients < 50 compared to patients $\geq$ 50 for the items "the departments physical facilities are visually appealing"; and satisfaction with the front desk service with $p<0.030$ and $p<0.006$ respectively as seen in table 3.

Intervention

After 3 months of data collection and analysis, a multidisciplinary team consisting of representatives from the front desk, management, radiology technologists and the study team (Master of Public Health student with doctor of medicine, Nuclear Medicine Board Certified PET-CT fellow, Attending Nuclear Medicine Physician board certified in radiology and Nuclear medicine) discussed relevant findings. Based on this discussion and feedback from patients received from front-line staff, one of the survey items with the lowest mean, "Documentation such as sign-in sheet, handouts and brochure as visually appealing" and the item with the highest frequency of low scores ($\leq$ 3), "The department provides services at the promised time" were designated as pain points for subsequent quality improvement interventions.

Through further analysis from all disciplines it was established that changes in protocol needed to be enacted to affect change in these two items. The team leader from the front desk drafted a preliminary protocol for document printing and preparation which the team approved. In order to provide services at the promised time, analysis of patient flow using a time point analysis with the goal of reducing patient wait time is ongoing. The questionnaire will continue to be filled by patients as we implement our intervention and beyond thereby serving as a tool for measuring the effectiveness of our

intervention by comparing post intervention to pre-intervention data as well as identifying areas for continuous quality improvement.

Discussion

Our results demonstrate that patient perception of quality was lowest for the items "*The department's physical facilities are visually appealing"* and "*Documentation such as sign-in sheet, handouts and brochure as visually appealing*". This should not come as a surprise given the fact that patients encounter the physical facilities and are handed out documentations upon arrival and throughout their stay at the radiology department. The item "*The department provides services at the right time"* resulted in the highest frequency of low scores (≤ 3), highlighting the fact that although most people did not see timing as a significant issue, a few people were very displeased with it.

Patients reported lowest satisfaction with the front desk service compared to services provided by radiology technicians and radiologist. This service is critical to the experience and perceptions of patients in a radiology department as it is responsible for scheduling, informing, responding to needs and communicating to patients throughout the day. This demonstrates the need for increased attention and resources to be directed at ensuring that structures and processes at the front desk are optimized to maximize patient perception of quality and satisfaction. We were also able to demonstrate that patient perception of quality and satisfaction with care is independent of the number of recent visits to the radiology department and gender. Patient perception of quality and satisfaction was unreliably affected by age.

This study utilized a standardized survey adapted from SERVPERF to assess patient perception of quality and satisfaction within a tertiary institutions' PET Center at the point of care. We demonstrated that patient perception of quality can be measured quantitatively at the point of care and used to identify areas for subsequent quality improvement initiatives. Few studies have attempted to quantitatively measure patient perception of quality in a diagnostic radiology center (*14,15*), and there have been fewer reports of subsequent quality improvement interventions guided by and measured with this information. Blomberg et al used a modified version of Quality from the Patient's Perspective questionnaire (QPP) to identify patient perception of quality and its association with patient demographics (*14*). Most of the questions in the study survey focused on the services the patients received prior to arrival at the diagnostic radiology center. Basu et al used patient reported data to determine patients' preferences for receiving imaging results (*15*).

Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) survey, which has become the standard for measuring patient experience in the hospital system is given to samples of inpatient and measures 9 key aspects of care (*16*), most of which are not reflective of services provided by radiology departments. In response, Press Ganey developed an outpatient survey, Outpatient and Ambulatory Surgery CAHPS (OAS CAHPS), more suitable for radiology departments (*17*). These questionnaires are not provided to patients at the time of their imaging services therefore likely limiting their effectiveness in capturing patient perception of the service. This emphasizes the need for a standardized way of measuring patient perception in radiology departments at the point of care that is reflective of the type of services provided. Although various studies demonstrate the use of SERVPERF in hospital settings (*13,18*), we did not come across any study that showed its' use to assess patient perception of quality in a diagnostic radiology center in the U.S.

Patient-centered care has received increased focus in healthcare since its inclusion in the Institute of Medicine's Landmark (IOM) report *Crossing the Quality Chasm* as 1 of the 6 aims of quality (*1,19*) It is defined as "care that is respectful of and responsive to individual patient preferences, needs, and values" (*1*). This definition highlights the need for active patient engagement in the healthcare design and delivery process. This approach to health care is one that radiology has been slow to incorporate, prompting RSNA to launch the "Radiology Cares: The Art of Patient-Centered Practice" campaign in 2012 with one of the goals to encourage radiologists' meaningful engagement in their patients' experiences throughout the continuum of their radiologic care (*20*).

The use of patient reported data ensures well directed quality interventions through prioritization of improvement initiatives based on the patients' greatest concerns. Prioritizing interventions based on value and utility is increasingly necessary due to the financial restrains with which healthcare operates. Patient reported experience measures (PREMs) have be shown to be a reliable measure of how well a hospital can provide good quality service from a patient's perspective (*16,21,22*). There is the potential to use this type of objective data to create industry wide standard metrics that can be used for comparison of performance between departments and creation of benchmarks as is done with other standardized surveys such as HCAHPS (*16*).

Limitations

Our study has several limitations. The survey did not have open ended questions and therefore did not allow for patients to elaborate on their thoughts and be more specific in their feedback. This undermines the patient centeredness of our quality improvement initiatives. Furthermore, our survey focused on the experience of patients receiving PET-CT examinations, and did not assess the patient

experience with other imaging modalities. This could lead to an inherent bias of quality with regards to one specific modality as opposed to other imaging modalities.

Another limitation is the fact that a lot of the items on our survey do not point to a specific causal individual or group. For example, the statement “employees insist on error free documentation” does not help ascertain whether this issue pertains to the front desk, technicians or physicians. For this reason, this tool should be used with care when making managerial decisions. It should be applied to make changes at the system level as opposed to the individual level. It is also important to understand that this survey is amendable to context specific modifications and is therefore encouraged to improve its’ face validity.

Conclusion

Our study measured patient perception of quality for use as evidence based guidance for quality improvement interventions while providing baseline data upon which to measure the effects of subsequent interventions. There is a need for continuous development and usage of metrics that measure performance in radiology departments at the point of care with the goal of eventually creating industry wide standard metrics that can be used for comparison of performance between radiology departments and creation of benchmarks. Measurement of satisfaction and perception of quality is likely to be more accurate when performed immediately after services are provided as opposed to weeks later which is the current standard of practice.

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Table 1. Questions measuring perception of quality and satisfaction.

1. The department's equipment is modern-looking.
2. The department's physical facilities are visually appealing.
3. The employees are neat and professionally appearing.
4. Documentation such as sign in sheet, handouts and brochures are visually appealing.
5. The department has convenient hours of operation.
6. The department provides services as promised.
7. The department is dependable in handling patient service problems.
8. The employees provide services right the first time.
9. The department provides services at the promised time.
10. The employees insist on error free documentation.
11. Employees keep users informed about when services will be performed.
12. Employees provide prompt service to patients.
13. Employees are always willing to help patients.
14. Employees are never too busy to respond to patients' requests.
15. Employees are courteous.
16. Employees instill confidence in patients.
17. Employees make patients feel safe while they receive services.
18. Employees have the knowledge to answer patient's questions.
19. Employees give patients individual attentions.
20. Employees have patient's best interest at heart.
21. Employees deal with patients in a caring fashion.
22. Employees understand the specific needs of patients.
23. The quality of the PET/CT center services:
24. My satisfaction with the front desk service can be best described as:
25. My satisfaction with the technologists' service can be best described as:
26. My satisfaction with the doctors' service can be best described as:
27. In summary, my satisfaction with the entire PET/CT center can best be described as:

Questions 1- 22 are adapted from SERVPERF questionnaire and measure perception of quality. Responses were based on a Likert type scale (1-7) demonstrating varying levels of agreement or disagreement with each question. Questions 23-27 were additional questions to measure patient satisfaction. Responses were based on a Likert type scale (1-7) ranging from very poor to excellent.

Table 2. Mean response for each item.

Items	Mean
1	6.4113*
2	6.1580*
3	6.7400
4	6.1620*
5	6.5600*
6	6.7429
7	6.6554
8	6.7264
9	6.5915†
10	6.5898*
11	6.7275
12	6.6784
13	6.8061
14	6.7629
15	6.8235
16	6.7676
17	6.8014
18	6.7765
19	6.8099
20	6.7962
21	6.8075
22	6.7536
23(1)	6.7392
24(2)	6.5792*
25(3)	6.8467
26(4)	6.7660
27(5)	6.7783

Table 2 shows the mean responses for the 27 items. (*) indicates scores lower than mean. (†) represents the item with the highest frequency of low scores (≤ 3). See table 1 for description of items.

Table 3. Differences in perception of quality and satisfaction.

Items	First visit vs multiple visits	Gender (M vs F)	Age (>50 vs ≤ 50)
1	0.492	0.372	0.361
2	0.475	0.072	0.030*
3	0.557	0.822	0.824
4	0.592	0.519	0.208
5	0.227	0.799	0.624
6	0.293	0.923	0.318
7	0.340	0.930	0.503
8	0.117	0.979	0.652
9	0.968	0.666	0.431
10	0.937	0.325	0.888
11	0.616	0.719	0.823
12	0.979	0.452	0.965
13	0.913	0.847	0.729
14	0.523	0.999	0.423
15	0.877	0.064	0.273
16	0.566	0.607	0.800
17	0.889	0.631	0.779
18	0.838	0.588	0.593
19	0.942	0.758	0.812
20	0.559	0.687	0.865
21	0.760	0.938	0.465
22	0.881	0.681	0.884
23(1)	0.537	0.365	0.508
24(2)	0.696	0.852	0.006*
25(3)	0.383	0.307	0.905
26(4)	0.568	0.056	0.525
27(5)	0.929	0.232	0.089

Table 3 shows differences in perception of quality and satisfaction based on based on number of visits, gender and age. Data reported as P-values. P value of <0.05 indicates statistical significance, denoted with (*). See table 1 for description of items.