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Using Servqualto Identify Gaps in Quality Care for Patients with Cystic Fibrosis: A Hospital-Based Quality Improvement Project

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USING SERVQUAL TO IDENTIFY GAPS IN QUALITY OF CARE FOR PATIENTS WITH
CYSTIC FIBROSIS: A HOSPITAL-BASED QUALITY IMPROVEMENT PROJECT

By

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CAPSTONE PROJECT

Submitted to the University of New Hampshire

in Partial Fulfillment of

the Requirements for the Degree of

Masters of Science

in

Nursing

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This Capstone Project has been examined and approved

Pamela P. DiNapoli, PhD, RN, CNL
Committee Chairperson

Date

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ABSTRACT

Using SERVQUAL to Identify Gaps in Quality of Care for Patients with Cystic Fibrosis: A Hospital-Based Quality Improvement Project

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University of New Hampshire, September, 2015

Background: Cystic Fibrosis (CF) Care Centers were established to centralize and integrate the knowledge and skills of pulmonary medicine, nutrition, gastroenterology, nursing, respiratory therapy, social work, and genetics to efficiently provide care for people living with CF. The high quality, specialized care that is given at CF Care Centers has led to the improved length and quality of life for people living with CF.

Aim: The aim of this quality improvement project was to identify any gaps in providing effective, high quality care to patients with CF to reduce the variability in nursing practices and improve their quality of care.

Methods: The site of this quality improvement project was a nationally accredited CF Care Center that serves both pediatric and adult patients with CF. Using the Chronic Care Model as the theoretical framework, a quantitative SERVQUAL survey was developed. The SERVQUAL survey is a tool that identifies gaps in quality of care. The tool was used to identify nurses' expectations and perceptions of the quality of care given to patients with CF.

Results: Forty-seven out of 60 (78.3%) nurses completed the SERVQUAL survey. The results of the gap analysis showed that each dimension of the survey had a negative gap score, which indicates a gap in quality of care. The unweighted gap score (UGS) of the tangibility dimension was -0.92 with a weighted gap score (WGS) of -13.40. The UGS of the reliability dimension was -0.53 with a -9.47 WGS. The responsiveness dimension's UGS was -0.65 and had a -11.76 WGS. The assurance dimension's UGS was a -0.72 with a -21.07 WGS. The UGS for the empathy dimension was a -0.45 with a WGS of -9.09.

Conclusion and Implications for CNL Practice: The results of the gap analysis indicate that to improve nurses' perceptions of CF quality of care and care delivery education should focus on the assurance, tangibility, and responsiveness dimensions, with less focus on reliability and empathy components. A summary of the gap analysis results, interpretations of the findings, and the role of the CNL in developing an educational module to improve quality of care are discussed.

Keywords: cystic fibrosis, cystic fibrosis care center, quality of care, quality improvement, SERVQUAL survey, Chronic Care Model

Using SERVQUAL to Identify Gaps in Quality of Care for Patients with Cystic Fibrosis:

A Hospital-Based Quality Improvement Project

Cystic fibrosis (CF) is a genetic disease that primarily affects the exocrine glands of the lungs and digestive tract. A defective gene and its protein product causes the body to produce an unusually thick, sticky mucus that obstructs the lungs causing life-threatening lung infections and hinders the pancreas from producing natural enzymes that help the body to break down food and absorb nutrients (Cystic Fibrosis Foundation, 2014). The disease primarily affects Caucasians and an estimated 30,000 children and adults are living with CF in the United States, with 70,000 people living with the illness worldwide (Cystic Fibrosis Foundation, 2014). To effectively and efficiently provide care for people living with CF, CF Care Centers were established to centralize and integrate the knowledge and skills of pulmonary medicine, gastroenterology, nutrition, nursing, respiratory therapy, social work, and genetics to provide specialized care to patients with CF from childhood to adulthood.

CF Care Centers provide comprehensive care through a close collaboration between the patient's primary care physician and pulmonologist with the specialized team of the CF Care Center to ensure that the continuity of care of this multi-systemic disease is maintained. Funding for CF Care Centers is provided by the Cystic Fibrosis Foundation and more than 110 cystic fibrosis care centers and 55 affiliate programs nationwide have been accredited (Cystic Fibrosis Foundation, 2014). The centers coordinate all patient CF care, hold ultimate responsibility for the patient's treatment and outcome, and should be capable of treating all CF associated complications. Centers are part of a university or teaching hospital where they are expected to develop teaching and research, particularly in the development of new life-extending therapies, to guarantee that the best therapies, treatments, and support are offered to patients with CF. The high quality, specialized care that is available through CF Care Centers has led to the improved length and quality of life of people with CF, where the current predicted median age of survival is in the early 40s (Cystic Fibrosis Foundation, 2014).

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Global Problem

In 2001, the Institute of Medicine (IOM) published the book *Crossing the Quality Chasm*, which was written in response to the challenges and barriers identified in the IOM's book *To Err is Human* (2000) and a *Journal of the American Medical Association* report (1998) that alerted healthcare to serious and widespread quality problems throughout medicine. Within the publication *To Err is Human*, it was estimated that about 100,000 people die every year in hospitals from injuries or illnesses contracted during their care in healthcare facilities (IOM, 2000). The *JAMA* report identified the three categories of underuse, overuse, and misuse as barriers to quality of care (Chassin & Galvin, 1998). Both publications called for changes in healthcare that would help improve the quality of care and health outcomes of patients within the healthcare delivery system.

In the publication *Crossing the Quality Chasm*, the IOM outlined six specific aims that a healthcare system must fulfill to deliver high quality of care. Care that is given to patients within the healthcare delivery system must be safe, effective, efficient, timely, patient-centered, and equitable (IOM, 2001). The IOM also defined observable metrics that healthcare systems could use as a measurement of each aim. These included mortality rates; cost analyses of care by patient, provider, organization, and community; waits and delays of receiving care; and patient satisfaction (IOM, 2001). If a healthcare system is able to achieve these six aims that are accompanied by acceptable performance measurements, then patient outcomes and quality of care will improve.

The Centers for Medicare and Medicaid (CMS) also saw the importance of improving the quality of care patients receive within healthcare delivery systems. Hospital Value-Based Purchasing is the effort that CMS is taking to link Medicare's repayment system to a value-based system to improve healthcare quality, including the quality of care provided in the inpatient hospital setting (CMS, 2014). Participating hospitals are paid for inpatient services based on the quality of care given, not the quantity of services provided. CMS adjusts hospitals' payments based on their performance in four domains that reflect hospital quality: the Clinical Process of Care, the Patient Experience of Care,

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Outcomes, and Efficiency. A Total Performance Score is given to the hospital based on the weighted scores achieved within each of the domains, where the Patient Experience of Care domain accounts for 30% of a hospital's Total Performance Score (CMS, 2014). The focus on the patient's experience reflects the movement towards patient-centered, safe, and effective care delivery and highlights the fact that the patient's experience with the care should be included along with the outcomes of care.

Local Problem

When a nurse accepts a position at a CF Care Center, s/he will be responsible for providing the day-to-day, direct patient care for patients with CF. Therefore, it is imperative that nurses are given the appropriate and ongoing education, training, and information necessary to provide evidence-based, patient-centered, high quality, and safe care through teamwork and collaboration to this unique population of patients. Currently, when a nurse accepts a position at the healthcare organization on one of the Medical Specialties floors, s/he participates in a two week long orientation that includes a self-learning module about CF.

The self-learning module includes the article "Cystic Fibrosis: Nurses act as a healthcare provider, advocate and educator for CF patients" (George & Hazle, 2011). After reading the article the nurse is expected to be able to identify diagnostic testing for CF; describe pathophysiology, clinical manifestations, and management of CF; and describe the nurse's role in promoting health and quality of life for the patient with CF. The article aims to highlight the current understanding about CF management and implications for nurses. The article describes the basics of CF as a genetic disease; how CF is diagnosed; the pathophysiology; medication management; infection control; effects on the gastrointestinal system and nutrition; and a few age-specific considerations. A ten question, multiple choice examination is then given to assess knowledge and understanding of the assigned content.

Members of the CF Care Team, Nurse Educators, and Clinical Nurse Specialists have expressed the need to enhance and expand the educational material provided to new nurses about CF. Eighty-five percent of nurses on the three Medical Specialties Units have been practicing for three

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years or less. Of new nurses working on the Medical Specialties Units, many have communicated their apprehension about their ability to provide high quality and safe care to patients with CF to members of the CF Care Team and Nurse Educators. With a 20% one year turnover rate of nurses working on the Medical Specialties Units, effective and appropriate education, information, and training needs to be provided to the new nurses who are being oriented to the units at least quarterly. On average, patients with CF are admitted four to six times annually. As their disease progresses, they are admitted more often each year. Admitted patients with CF are hesitant to allow new nurses to care for them and have refused to allow new nurses to provide their care.

Literature Review

There have been many studies investigating the patient's perception of the care required for a patient living with a chronic illness. The purpose of this literature review was to determine critical elements necessary to provide quality care to this population of patients. For the purpose of this literature review, the databases were accessed through the University of New Hampshire's Library. To investigate the evidence available on the patient's perception of living with a chronic illness and the care that s/he desires during an admission to the hospital, the key words "cystic fibrosis", "chronic illness", "experience of care", and "inpatient care" were initially utilized. Limits used to narrow the search were English-only articles, human samples, references available, peer-reviewed, evidence-based, full text, and PDF full text. The relevant inclusion criteria applied was ages over 18 years, both sexes, all publications, and articles published within the past five years (2010-2015). The applicable exclusion criteria pertained to non-English articles, non-human samples, publications greater than five years old, and patients younger than 18 years of age.

The databases investigated were CINAHL, PubMed, MEDLINE, and ScienceDirect. CINAHL identified 12 articles matching the previously mentioned key words, four of which were appropriate to inpatient experience of care. PubMed generated 59 research articles, six of which pertained to all of our key word restrictions. MEDLINE found 21 articles, four of which were applicable to this literature

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review. ScienceDirect found 187 articles where six were associated with experience of care for a patient living with a chronic illness. After reviewing the articles obtained from the numerous databases and applying the applicable inclusion and exclusion criteria, 20 articles were identified. After adjusting for duplicates, a total of eight articles were considered relevant. Three of these articles were then excluded based on the data not pertaining to inpatient care during a hospital admission, leaving a total of five articles for review.

The article “Creating a Patient-Centered Health Care Delivery System: A Systematic Review of Health Care Quality From the Patient Perspective” written by Mohammed, Nolan, Rajjo, Shah, Prokop, Varkey, and Murad (2014) is a systematic review and meta-analysis that looked at patient perceptions of quality care that could be used in planning and evaluating healthcare delivery and to help better understand the factors that affect patient perceptions of healthcare organizations. The systematic review contained articles from 1995 to February 2014 and included the databases MEDLINE, EMBASE, Cochrane Database of Systematic Reviews, Google, and Scirus. Detailed inclusion and exclusion criteria were applied to identify eligible studies. Thirty-six studies met the defined criteria- 25 quantitative studies, seven qualitative, and four mixed-methods. The study settings ranged from primary/ambulatory care, inpatient care, and emergency services. The targeted population of patients included those with chronic illness and those with mental health conditions.

A total of ten dimensions of healthcare quality were identified- communication, healthcare access, shared decision making, clinical quality/provider knowledge and skills, physical environment, patient education, electronic medical records, pain control, discharge process, and preventative services. For a patient with a chronic illness that is in an inpatient setting, the most important healthcare quality dimensions are communication, shared decision making, and clinical quality/healthcare provider knowledge and skills. Included in communication is the provider’s ability to communicate effectively, care team helps patients understand their medical condition, and team collaboration. Shared decision making includes patient participation in decision making and caring for the patient as an individual.

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Clinical quality/healthcare provider knowledge and skills encompasses highly knowledgeable and skilled nursing practices, high technical and clinical quality of the healthcare provider, in-service training for nurses with special emphasis on communication, and the healthcare provider is skillful and knowledgeable about the chronic disease.

The article “Creating a Patient-Centered Health Care Delivery System: A Systematic Review of Health Care Quality From the Patient Perspective” is of Level A evidence, where the meta-analysis of multiple controlled studies consistently support a specific intervention. The study identifies patients’ perceptions of healthcare quality, which will help healthcare delivery systems to move towards more patient-centered, safe, and effective delivery of care. However, the study did recognize that most studies included only measured a single patient encounter experience, which would limit the generalizability of the results. Also, the study’s authors were not able to provide relative importance weights to each of the ten dimensions identified; therefore, limiting the ability of ranking each of the dimensions according to the importance levels for patients. Reporting bias may have been included in the study, due to the patient’s non-quantitative observations with the healthcare delivery system.

“Cystic fibrosis (CF) care through the patient’s eyes- A nationwide survey on experience and satisfaction with services using a disease-specific questionnaire” was written by Steinkamp, Stahl, Ellemunter, Heuer, van Koningsbruggen-Rietschel, Busche, Bremer, and Schwarz (2015), which looked at the patient’s experiences with care provided in CF Care Centers. The development and validation of the disease-specific questionnaire is detailed and discussed in the article “Patient experience in cystic fibrosis care: Development of a disease-specific questionnaire” (2014). A nationwide survey was conducted in 2011 inviting 90 CF Care Centers to contribute. Patient participation was voluntary and each participant received an anonymous questionnaire, a response postcard, and a pre-paid envelope. Once the questionnaire was completed, the participant mailed the survey back in the pre-paid envelope and also mailed the response postcard back to the CF Care Center indicating that no survey reminders are necessary. Descriptive results are expressed as means with

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standard deviations of the mean and comparisons between groups were made with two-tailed t-tests. For each item the percentage of respondents reporting a problem was calculated, thus displaying the problem score with a score of zero percent being ideal and indicating no problem.

Of the 90 CF Care Centers that were invited to participate, 56 took part in the survey. CF Care Center staff recruited 1,642 adult CF patients to participate in the survey. There was a 74% response rate, which equated to 1,215 survey participants. While the overall experience with the care received at the CF Care Center was favorable, there were a few survey items with high problem scores. Inpatient Facilities, Hygiene, and Service had a problem score of 30%; Information, Training, and Education was 25%; and both Nurse-Patient Interaction and Inpatient Care on the Unit had a 20% problem score.

Inpatient Facilities, Hygiene, and Service indicated that 45% of adults find the food poor, 33% find the personal environment poor, and 27% find the toilets poor. Information, Training, and Education showed that 48% of adults are not told about medication side effects to watch for, 46% are not under the impression that the CF staff are doing everything possible to inform the patient about test results quickly, and 39% do not feel that they are being informed about new medical developments in the treatment of CF. The Nurse-Patient Interaction and Inpatient Care on the Unit specified that 56% of adult CF patients do not feel that they can discuss their fears and anxieties with nurses, 37% feel that they are not well looked after by nursing staff in terms of expertise, and 27% do not have confidence and trust in the nurses caring for them.

The article “Cystic fibrosis (CF) care through the patient’s eyes- A nationwide survey on experience and satisfaction with services using a disease-specific questionnaire” is of Level B evidence, where a well designed controlled study consistently supports a specific intervention. This study also identified patients’ perceptions and satisfaction of healthcare quality, which will help healthcare delivery systems to move towards more patient-centered, safe, and effective delivery of care. A limitation of the study was that not all patients were recruited at each of the 56 participating CF Care Centers and not all recruited patients returned the questionnaire. This could have affected the

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experiences and satisfaction levels that the patients identified as significant. Also, since the survey was only distributed to patients with CF, the experiences and perceptions of quality of care cannot be generalizable to other acute or chronic diseases.

Another collection of patients with CF were surveyed in the study described in the article “Experience of care from the perspective of individuals with cystic fibrosis and families: Results from 70 CF Foundation accredited programs in the USA” that was written by Homa, Sabadosa, Marrow, and Marshall (2014). The development and validation of the disease-specific, experience of care survey is detailed and discussed in the article “Development and Validation of a Cystic Fibrosis Patient and Family Member Experience of Care Survey” (2013). A nationwide survey was conducted between September 2012 and December 2013 that invited 119 CF Care Centers to partake in. Patient participation was voluntary and each participant completed the survey by either internet, interactive voice response, or with the help of a telecommunication professional. A multivariable logistic model was used to determine variables predictive of best experience of care, chi-square test compared characteristics of the patient population with a probability value of less than 0.01 to define a significant difference, and 95% confidence intervals were used to determine differences.

Of the 119 CF Care Centers that were invited to participate, 70 took part in the survey- 30 adult CF Care Centers and 40 pediatric centers. CF Care Center staff recruited 7,113 individuals to participate in the survey. 839 adults, 28% of adult invitees, completed the adult survey and 1,251 parents, 30% of family invitees, completed the pediatric survey. In the adult survey, there were areas of improvement opportunity identified that included experiences with timely CF care, experiences with CF healthcare team, experiences with self-care, and hospital care. Within the experiences with timely CF care, 41% of adults indicated that their CF care and treatments did not start within 15 minutes of the scheduled time. The experiences with CF healthcare team indicated that only 57% of adults are asked about their mental or emotional health and 15% of adults rated their mental health as fair or poor. Just 62% of adults are able to maintain their body weight, which was included in the experiences with

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self-care section. The hospital care section specified that 37% of adults feel that the hospital staff is not knowledgeable about CF care, specifically in regards to infection control procedures, being treated as an individual, and information exchange between outpatient and inpatient staff. Only 47% rated their overall care from the healthcare team as the best possible care they could receive.

The article “Experience of care from the perspective of individuals with cystic fibrosis and families: Results from 70 CF Foundation accredited programs in the USA” is of Level B evidence, where a well designed controlled study consistently supports a specific intervention. Identifying patients’ perceptions and experience of healthcare quality and inpatient admissions will help healthcare organizations to move towards more patient-centered, safe, and effective delivery of care. The aspects of care identified in this study correlate with those patient perceptions of healthcare quality found in the systematic review and meta-analysis by Mohammed et al (2014). However, only about 30% of respondents returned the survey, which may have limited the perceptions and experiences of care identified in the study. The response of over 2,000 participants helps to establish precision of the results, but with the large number of survey respondents, it is important not to over interpret small differences in results and the level of relevant difference was not established in this study.

In the article “Application of a Microsystem-based Project to Improve the Inpatient Care of Adults with Cystic Fibrosis”, Cohen, Jaffrey, Fulman, Maniscalco, Ryan-Frank, and LaVecchia researched and analyzed barriers to effective CF inpatient care with the aim to implement two microsystem-based quality initiatives to improve the inpatient care of patients with CF in a 500-bed academic adult medical center (2013). Although the two quality initiatives that were implemented did not include an orientation education module, they did perform an analysis of the microsystem assessment from the point of view of 40 CF patients, as well as assess the CF knowledge and perceptions of the 30 healthcare team members providing direct patient care.

The survey identified various barriers to effective CF care, which included frequent rotation of medical house staff (high turnover rate), difficulty in overcoming the inertia of prior practices, the

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presence of external barriers (patient characteristics), and healthcare professionals' time constraints. Other data collected from the CF patient and staff surveys indicated that there was a 15 to 31 hour delay from time of admission to time of first respiratory treatment; there was a 13 to 18 hour delay from time of admission to administration of first IV antibiotic dose; pancreatic enzyme replacement therapy was not dispensed with meals 86% of the time; 68% of patients felt that their needs were not being met, therefore increasing anxiety about being admitted to the hospital; only 50% of staff felt comfortable caring for patients with CF; and the majority of healthcare staff working on the inpatient unit felt that patients with CF are too needy. Seventy-five percent of patients also reported gaps in the delivery of their home administration routines, causing sleep disruption and delays in medication delivery due to healthcare staff being busy elsewhere, and 5% complained of missed doses of medications altogether because they were sleeping or not in their rooms.

The article "Application of a Microsystem-based Project to Improve the Inpatient Care of Adults with Cystic Fibrosis" is of Level C evidence. It was found that using the clinical microsystem approach and working together as an interdisciplinary team while incorporating patient perceptions and experiences with healthcare quality can improve quality of care and patient satisfaction. The quality improvement initiatives implemented in the medical center were sustainable and continue to remain in effect, which was thought to be due to gaining staff input and inclusion with the quality improvement initiatives. However, the study was conducted at a single medical center, which may not be generalizable to other healthcare facilities. Also, the surveyed population was patients with CF and the results may not be generalizable to other acute or chronic diseases.

Visse, Abma, van den Oever, Prins, and Gulmans studied the experiences of patients with CF with their hospital admission and evaluated how they perceive their treatment and care as an inpatient in the article "Perceptions of hospital admission in patients with cystic fibrosis" (2013). CF specialized nurses at seven CF Care Centers were invited to help recruit patients to participate in the research study, with the aim to include four participants from each CF Care Center for a total of 28 patients.

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The patients with CF were recruited before their admission and an explanation of the purpose and procedure of the research study was presented to the patient along with a written leaflet of procedural information regarding patient interviews and diary use. The research study was conducted between November 2009 and July 2010 and included 19 participants. Confidentiality and informed consent forms were signed by the patients for participation in the in-depth interviews and data collection and analysis of the patient care diaries by study researchers. The participants also received a print-out of the interview and diary transcriptions to ensure the interpretations of the data collection were correct and to see if the participant would like to change anything before the data was included in the analysis.

The study findings were organized into five contexts with themes- before admission and arrival, treatment and care, room and stay, discharge, and social and societal. In the before admission and arrival context, the main concern is uncoordinated care. Patients are not satisfied with their first day of admission and complain of waiting a considerable amount of time before starting treatments, with the majority waiting about six hours. The treatment and care context revealed that there are four main concerns- trust in technical performance of staff; quality of information, communication, and contact; acknowledgement of self-expertise; and consistency of infection control and segregation policies. The trust in technical performance of staff concern includes experiencing medication errors and the lack of IV access experience in healthcare professionals. Quality of information, communication, and contact concerns consist of being given inaccurate and irrelevant information, not being treated as an unique individual, the poor quality of the personal human contact experienced, and the lack of attention given to the patient. Within the acknowledgement of self-expertise context, concerns include the lack of medical professionals acknowledging the patient's experiential knowledge about their chronic illness and not including the patient's opinions in their treatment and care. The consistency of infection control and segregation policies concern contains an inconsistent nature of adhering to the policies and not having the final decision as to whether or not follow these policies since very few of patients with CF are genuinely concerned about cross-infection.

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The room and stay context concern is the lack of freedom. Most patients feel locked up in their rooms and that their freedom is restricted. They believe that this segregation has a negative impact on their recovery since they cannot be mobile or be in contact with other people. Generally, patients are satisfied with the room facilities, design and atmosphere of the room, meals, and hygiene; however, they would like to be able to decide themselves when their meal is served to them. The social and societal context includes concerns related to flexible visiting hours and the integration of school and work. Some patients report that their intimate relationships are affected by the limited visiting hours and the daily schedules while in the hospital do not allow for sufficient time to incorporate work and school responsibilities. The two concerns in the discharge context is the inability of saying good-bye to nurses and other healthcare staff before leaving and having to wait up to eight hours for the pharmacy to prepare the necessary medications for them to take home to continue their treatments.

The article “Perceptions of hospital admission in patients with cystic fibrosis” is a qualitative study and of Level C evidence. The themes identified within this study do correlate with the aspects of care found in the systematic review and meta-analysis by Mohammed et al (2014), the study by Steinkamp et al (2015), and the study by Homa et al (2014). Even though the study’s results associate with other studies results, the small number of participants could have affected the perception and experience results. Reporting bias may have been introduced into the study if the participant did not keep a diary of his or her admission, since the interview was conducted two weeks after discharge. Validity and reliability of the study were increased by combining multiple data collection methods.

Synthesis of the Evidence

The literature review revealed many common perceptions patients with CF experience during their admissions to the hospital. Overall, effective communication, participation in shared decision making, and the presence of highly knowledgeable and skillful staff are essential requirements when patients with CF are admitted. The patients require team collaboration and an increased understanding about their chronic condition, which would help them to improve their self-care and management of

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their disease when they leave the hospital. The concern about uncoordinated care is evident throughout the studies as well. They experience long delays before beginning respiratory and antibiotic treatments after admission and throughout their admission medications are not dispensed at appropriate times nor coordinated based on the patient's home administration schedules or routines. Communication about medication side effects, laboratory test results, and the information exchange between outpatient and inpatient staff needs to be improved as well.

Shared decision making includes having patients be active participants in the decisions about their care and treatment options. Acknowledgement needs to be given to patients with CF about their expertise with their disease. These patients have lived with this chronic illness all their lives and have become experts when it comes to their health and body. Having patients be active participants in their hospital admissions will not only help to recognize the patient's knowledge and opinions, but build responsibility for their care and treatment. Patients also feel that this includes the decision of whether or not to adhere to the strict infection control and segregation policies that are enacted during hospital admissions. Very few patients with CF are genuinely concerned about cross-contamination, don't follow these procedures when outside of the hospital environment, and honestly feel that the segregation and restricted freedom has a negative impact on their recovery (Visse et al, 2013). Shared decision making also involves the decision of when to have their meals delivered to them.

To care for patients with CF, all staff needs to be highly knowledgeable and skillful about CF as a chronic disease and the medications and treatments necessary to live with this chronic illness. Nurses require practices that are consistent with the needs of the patient with CF, which includes training on therapeutic communication skills. Many patients expressed that they are not able to communicate their fears and anxiety with nurses and are rarely asked about their mental or emotional health. This lack of communication negatively affects the patient's perception of nurses, resulting in little or no confidence and trust in them. The patients do not feel that their needs are being met while in the hospital nor that they are well looked after by the nurses caring for them in terms of expertise,

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which in turn increases their anxiety and fear about hospital admissions.

One of the most important perceptions patients with CF share that was consistent throughout all research studies performed was the requirement of caring for the patient as a unique individual. They want individualized treatments and care and not to be seen as just another patient with CF. Many patients have been given inaccurate and irrelevant information that does not pertain to their personal circumstance. There is a lack of attention given to patients with CF and the contact that is achieved is of poor, impersonal quality. This may be due to the staff not being comfortable with providing care to patients with CF or the staff's view of the patient being too needy (Cohen et al, 2013).

Aims

Global Aim

The global aim of this quality improvement project was to identify any gaps in providing high quality, evidence-based care and support to patients with CF to reduce the variability in nursing practices and improve the quality of care these patients receive.

Specific Aim

The specific aim of this project was to complete an analysis of nurses' expectations and perceptions of the quality of care patients with CF receive at the facility by June 13, 2015. The data will identify gaps in the perceived quality of care provided, which will then be used to create an educational module focusing on CF that will be given to all new nurses at orientation hired on all three of the Medical Specialties Units at the healthcare organization. The new CF educational module will improve nurses' perceptions of quality of care and care delivery, thereby improving the quality of care patients with CF receive and increasing patient satisfaction as evidenced long term by increased HCAHPS scores.

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Methods

Setting

The site of this quality improvement project is the only nationally accredited CF Care Center in New Hampshire that has served both pediatric and adult patients with CF across the state and in eastern Vermont since 1972. The Medical Specialties Units are located on 1, 2, and 3 East and can accommodate 45 inpatients. There are twelve nurses that staff the Medical Specialties Units each 12 hour shift- five on 1 East, four on 2 East, and three on 3 East. There are five LNAs that staff the units each 12 hour shift as well- two on 1 East, two on 2 East, and one on 3 East. Currently there are 60 full time nurses, with various nurses floating onto the unit when the need arises, and 41 full time LNAs.

The purpose of these units is to provide comprehensive therapy services to help patients with CF regain their functional independence by allowing them to return to normal daily self-care, work and leisure activities by improving their respiratory function. They do this by working with the patients to increase their activity tolerance and independence through breathing retraining, oxygen therapy, exercise reconditioning, and addressing lifestyle changes through lifestyle assessments. They also provide techniques for stress management, evaluate home respiratory regime through equipment function and pulmonary hygiene, provide medication information, give work simplification and energy conservation techniques, offer dietary management, and supply general health maintenance information to improve function and activities of daily living.

Medical Specialties consists of 3 floors with 45 beds in private rooms. The average daily patient census is 45 patients. There are one or two discharges per day, with subsequent admissions later that same day. The units are at capacity on any given day with maximum patient census. The highest number of patients with CF that Medical Specialties can accommodate at one time is 12 patients, but there are seven or eight on average. There are a little over 200 patients with CF being cared for at this CF Care Center, where 100 of these patients are 18 years or older. Patients with CF are admitted to the Medical Specialties Units once they reach the age of 18 and the oldest patient with CF that is cared for

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at this CF Care Center is 57 years old. The sex distribution for patients with CF is about 60% males, 40% females. Only those patients experiencing CF exacerbations are admitted into the hospital; pulmonary hygiene is administered at the outpatient CF Care Center Clinic. Those patients that are experiencing CF exacerbations stay for 14 days. The highest patient census of patients with CF is seen in the spring, fall, and winter months due to allergy and temperature related respiratory exacerbations.

Theoretical Framework

Wagner, Austin, Davis, Hindmarsh, Schaefer, and Bonomi described the system changes associated with improvements in chronic illness care and the organization of these changes into a framework to guide quality improvement in the article “Improving Chronic Illness Care: Translating Evidence Into Action” (2001). The framework outlined by the authors is called The Chronic Care Model (CCM). The origin of the CCM came from the realization that most patients with chronic illnesses exhibit a common set of challenges- dealing with the symptoms, disability, emotional impacts, complex medication regimens, difficult lifestyle adjustments, and obtaining helpful and adequate medical care (Wagner et al, 2001). However, the physical, social, and psychological necessities of these patients are not being managed or supported by effective or efficient healthcare. These requirements need to be met for patients to take a more active role in their care management and become self-managers of their chronic illness.

If patients are to step into the role of self-managing their chronic conditions, then the healthcare system needs to be structured better to ensure that the patients are capable of doing this. Healthcare needs to verify that patients have the confidence and skills to manage their condition, the most appropriate treatments to assure optimal disease control, prevention strategies to avoid complications, a mutually agreed upon care plan, and careful continuous follow-up (Wagner et al, 2001). In order for the healthcare system to meet the necessities of those patients with chronic conditions, a multifaceted approach needs to be employed. The research has shown that the more comprehensive the intervention, the more likely it is to be successful (Wagner et al, 2001). However, the interventions cannot only

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target provider's behaviors; they must include interventions directed at patients if patient outcomes are to be improved. For the patient's well-being to be positively affected, systemic efforts need to be utilized that increase the patient's knowledge, skills, and confidence to effectively manage their own chronic conditions.

The lack of a common performance improvement framework has been a barrier to quality improvement efforts in chronic disease. The CCM was developed to help guide improvements in chronic care by incorporating the evidence-based research available that is useful to diverse healthcare organizations wanting to improve the care of their patients with chronic conditions (Wagner et al, 2001). Integral components of the CCM are the continuous relationships with the care team, individualization of care according to the patient's needs and values, care that anticipates these requirements, services based on evidence, and cooperation among clinicians (Wagner et al, 2001). Productive interactions between the patient and the care team characterize high quality chronic illness care. These interactions help to ensure that patients are active, informed participants in their own care by providing the necessary information, skills, and confidence required for their involvement. Effective clinical and behavioral management by the healthcare team is also given through these interactions by offering evidence-based clinical care strategies.

There are six core elements included in the CCM to help guide quality improvement strategies for patients with chronic diseases and chronic care management through the synthesis of evidence-based system changes- healthcare organization and leadership, linkage to community resources, support of patient self-management, coordinated delivery system design, clinical decision support, and clinical information systems. The CCM was built on the principle that these six core elements work together to create productive interactions between an informed, active patient and a prepared, proactive healthcare team. The improvements to the organization and its practices that contribute to these interactions are the leading influence to the enhancements in patient care, management, and outcomes that the CCM delivers.

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In order for patients to take a more active role in their care management and become self-managers of their chronic illness, their physical, social, and psychological needs have to be managed and supported by effective and efficient healthcare. Integral components of the chronic care model are the continuous relationships with the care team, individualization of care according to the patient's needs and values, care that anticipates these requirements, services based on evidence, and cooperation among clinicians. These interactions help to ensure that patients are active, informed participants in their own care by providing the necessary information, skills, and confidence required for their involvement.

Effective communication, participation in shared decision making, and the presence of highly knowledgeable and skillful staff are essential requirements when patients with CF are admitted. The patients require team collaboration and an increased understanding about their chronic illness, which would help them to improve their self-care and management of their disease when they leave the hospital. Patients need to be active participants in the decisions about their care and treatment options, which should be individualized so that patients feel that they are being cared for as a unique individual. The components of the chronic care model effectively highlight what patients with cystic fibrosis consider high quality of care to be, which should be included in their clinical care strategies.

Intended Improvement

The facility has been accredited as a CF Care Center since 1972 and has been providing care and treatments to patients with CF since that year. Nevertheless, admitted patients are still refusing to allow new nurses to provide direct patient care for them. It can be presumed then that the patient's confidence and trust in the new nurse's knowledge, skills, and abilities is low and that they have concerns about the quality of the care that will be given to them. The purpose of this quality improvement project was to analyze nurse's perceptions of gaps in quality of care using the SERVQUAL survey tool.

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The SERVQUAL survey was developed by Parasuraman, Zeithaml, and Berry and described in “SERVQUAL: A Multiple-Item Scale for Measuring Consumer Perceptions of Service Quality” (1988). Service quality is an abstract concept due to its features of intangibility, heterogeneity, and inseparability of production and consumption (Parasuraman, Zeithaml & Berry, 1988). Since objective measures are absent, a suitable method to assess service quality is to measure consumer’s expectations and perceptions of quality. The survey was developed to quantitatively measure the quality of services delivered to consumers through the assessment of expectations and perceptions of the service provided. The expectations of consumers identify what the needs and requirements of the consumers are and what they expect the service provider to offer. The perceptions of consumers identify what they feel and believe that the service provider is actually offering.

The SERVQUAL survey includes the five dimensions of tangibility, reliability, responsiveness, assurance, and empathy. The tangibility dimension consists of questions one through three. This dimension asks about the tangible components of quality of care and includes current and visible infectious disease, pulmonary disease, and pancreas and diabetes policies. Questions four through seven encompass the reliability dimension of the survey. This dimension inquires about how reliable the hospital is to its patients, and includes promises made by the hospital, sincerity in solving problems, getting things right the first time, and providing timely services and treatments. The responsiveness dimension consists of questions eight through ten and asks about how reactive personnel are towards patients, how responsive staff are to delivering medications on time, their ability to respond to patient requests, and when services and treatments will be performed. Questions eleven through thirteen make up the assurance dimension of the survey and ask about the behavior of personnel, staff knowledge, and staff ability to answer disease-related questions. The last dimension of the SERVQUAL survey is the empathy dimension, which consists of questions fourteen through seventeen. This dimension inquires about personnel treating patients as unique individuals, patients being allowed to be active

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participants in decision making, communication and collaboration, and an understanding of specific patient needs.

Each dimension is separated into two statements- one to measure the general expectations about the service being provided and the other to measure the perceptions about the specific facility whose quality of service is being assessed. A seven point Likert scale ranging from “Strongly Disagree” (1) to “Strongly Agree” (7) accompanies each statement. Each statement earns a gap score by subtracting the perceptions score from the expectations score. The gap scores could range from -6 to +6, with more positive scores representing a perceived level of service which is equal to or exceeds consumer expectations. A negative gap score indicates more room for improvement and should be prioritized higher in quality improvement initiatives to improve consumer perceptions.

The developers of the SERVQUAL survey also found that consumers do not consider each of the service quality dimensions equal and the dimensions are not consistently important (Parasuraman, Zeithaml & Berry, 1988). Therefore, the SERVQUAL survey assesses the importance of each dimension to the participant by having them allocate a total of 100 points across the five dimensions. This allocation allows for a measure of importance that can be used to determine which of the service quality dimensions are the most significant to the consumers. These importance scores are also used to calculate the SERVQUAL weighted score for each dimension by multiplying the gap score by the importance score. The weighted scores provide greater insight to the overall importance of the service quality dimension to the participant; therefore, allowing the implementation of more targeted quality improvement initiatives.

For the purpose of this quality improvement project, the SERVQUAL survey questions (Appendix A) were modified to ask about CF Care Center characteristics and evidence-based standards of care from the CF Foundation, and adapted to identify the gaps in quality of care patients with CF receive. Due to the concern of patient survey fatigue, the CF Care Team preferred if the survey focused on nurses’ expectations and perceptions of CF quality of care instead of the patients’. Although the

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survey is intended to analyze consumer expectations and perceptions, it was decided that nurses would be surveyed since they are the healthcare providers that have the most contact with patients with CF and provide the care while the patient is in the hospital. This adaptation would help to acquire nurses' points of view of the quality of care they give patients and identify the gaps in this care, so a new educational module focusing on quality of care and care delivery could be focused on these gaps. The survey modification would also help to engage the nurses in quality improvement and increase their self-awareness of the quality of care they afford patients with CF. A five point Likert scale was used to assist in the ease of condensing participants' responses.

A perception score of 4 out of 5 (80% of the maximum) is the minimum score needed to measure true satisfaction of the dimension and each of the statements within the dimension (Parasuraman, Zeithaml & Berry, 1988). For example, if the participant's perception score for each of the statements within the Empathy dimension is a 4 or 5 out of 5, then this indicates an acceptable level of satisfaction with the Empathy dimension. However, if the perception score for a statement is a 3 or below, then this indicates an unacceptable level of satisfaction. The unweighted and weighted SERVQUAL scores were calculated for each dimension. The total SERVQUAL weighted gap scores were calculated to determine the dimensions where quality improvement initiatives should be targeted.

For the purpose of this project, the results of the gap analysis will be used to guide the development of a new educational module to be given to nurses at orientation. Current, evidence-based research and practice will be incorporated into the orientation module that address the patient's perceptions and perspectives and teaches new nurses about how to improve and expand their CF knowledge and skills. The new CF educational module will improve nurses' perceptions of quality of care and care delivery. The module may also result in increasing the efficacy of new nurses, improving patient's satisfaction and experiences with hospital admissions, raising the new nurse's confidence level in providing high quality and safe care to patients with CF, and increasing the patients with CF willingness to allow new nurses to provide direct patient care for them.

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These characteristics can be measured by re-evaluating the quality of care patients with CF receive through another SERVQUAL gap analysis survey administered three to six months after orientation and by examining patient satisfaction through HCAHPS scores. This will help certify that all nurses working on these units are provided with the most current and appropriate information regarding care and treatment of patients with CF, which will ultimately improve the quality of care these patients are afforded during hospital admissions.

Data Sources

A literature review was completed to identify patients' with CF perceptions about their hospital admissions. The research studies included the experiences of 2,113 adult inpatients with CF, along with a systematic review and meta-analysis of the perceptions of adult inpatients' with chronic diseases. The studies identified what patients would like for the healthcare team to know about CF and their care and treatments while they are admitted to the hospital. Other important perceptions that were observed were what ideal CF care would be like for them; what practices and procedures work well at healthcare facilities; how the healthcare staff could provide even better care; and what qualities, knowledge, and skills their healthcare team would demonstrate.

An analysis was then performed to identify nurses' expectations and perceptions of the quality of care patients with CF receive. The tool used to complete the analysis was a modified SERVQUAL survey. The survey was intended to better understand nurses' expectations and perceptions of the quality of care and services provided to patients with CF to identify the gaps in quality of care. The standards of care that are considered essential for patients with CF were compared with what is actually being achieved on the Medical Specialties Units. Through the completion of this survey, the gaps in quality of care and treatment were identified. The gap analysis provided the details that the new CF educational module should focus on with the intent to fill in these gaps with appropriate nurse education that closes the loop.

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Results

SERVQUAL Survey Collection

The SERVQUAL survey was distributed to any nurse working on the Medical Specialties Units that provides direct patient care on 1, 2, and 3 East from May 23, 2015 to May 26, 2015. The survey was given to night shift nurses on May 23rd and May 26th and to day shift nurses on May 24th and May 25th. All nurses were given an hour to finish the survey before collection processes began. Nurses who were not able to complete the survey within the timeframe were instructed to place it in an appropriately labeled manila envelope taped next to the shift schedule in the unit office. All surveys were collected from the manila envelopes the following day. A total of 47 out of 60 (78.3%) nurses completed the SERVQUAL survey. After collection, the surveys were assessed for completeness. Of the 47 surveys that were completed, none were found to be incomplete and all 47 surveys were used for the gap analysis.

SERVQUAL Survey Dimension Scores

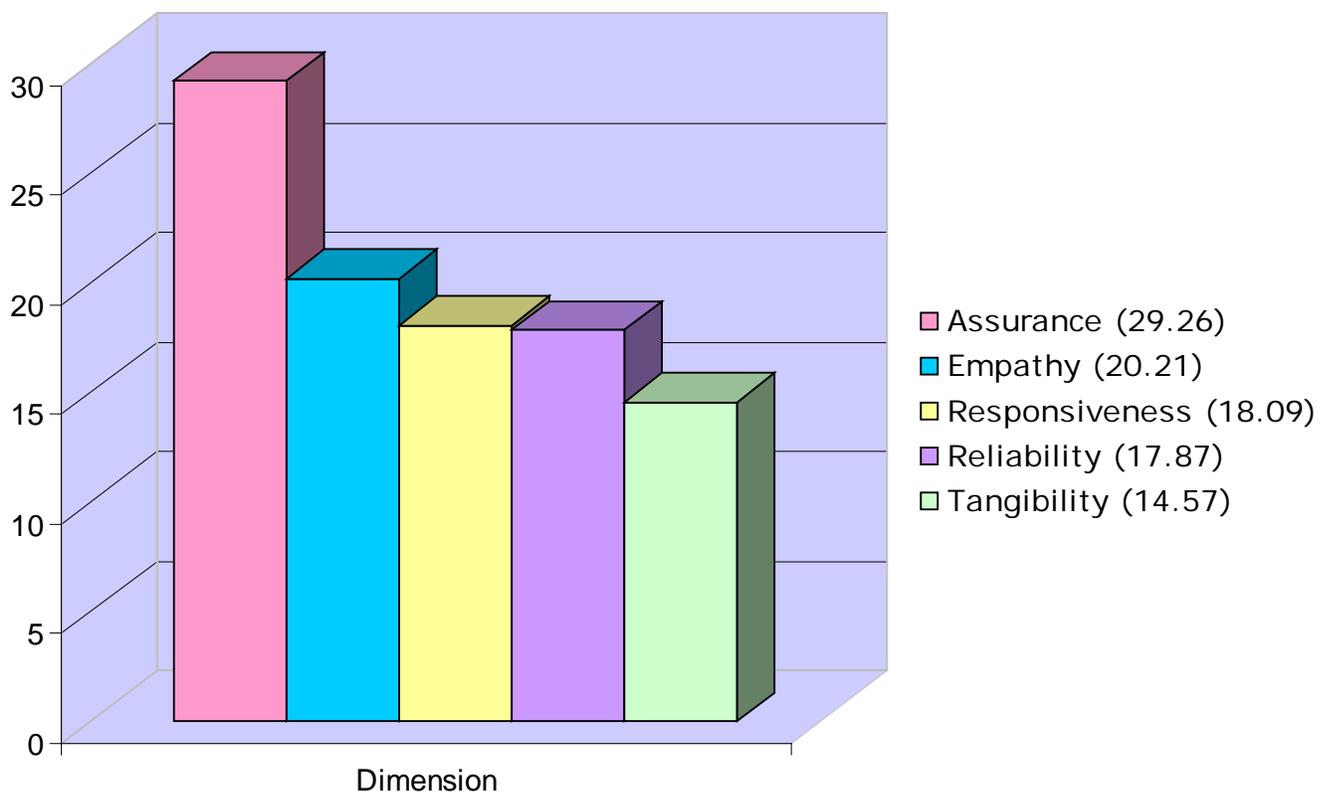
The survey that was administered to the nurses included a section between the expectation and perception statements of quality care that asked participants to divide 100 points between the five dimensions according to the importance they assigned to each dimension. The most points were assigned to the dimension that was the most significant and fewest points to the least significant dimension. The average importance ranking for each of the dimensions was calculated and found to be, from most to least important:

1. Assurance (29.26)
2. Empathy (20.21)
3. Responsiveness (18.09)
4. Reliability (17.87)
5. Tangibility (14.57)

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The averaged dimension importance scores were used to calculate the weighted gap scores for each dimension. The weighted gap scores were calculated by multiplying the averaged dimension weight and the averaged unweighted dimension gap score. The weighted score helps to establish the significance between the expectation and perception gaps that were assessed in this quality improvement project. Figure 1 illustrates the averaged importance weights for each of the five survey dimensions.

Figure 1. Dimension Importance Weights



Dimension Satisfaction

A perception score of 4 out of 5 (80% of the maximum) is the minimum score needed to measure true satisfaction of the dimension and each of the statements within the dimension (Parasuraman, Zeithaml & Berry, 1988). For complete satisfaction, each perception statement within

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the dimension needs to be a 4 or higher. If the perception score for a statement is a 3 or below, this indicates an unacceptable level of satisfaction for the dimension. Within the completed SERVQUAL surveys, 23 out of 47 (48.94%) nurses indicated unsatisfactory levels for the tangibility dimension; 26 out of 47 (55.32%) nurses were dissatisfied with the reliability dimension; 30 out of 47 (63.83%) nurses indicated an unacceptable level of satisfaction with the responsiveness dimension; 10 out of 47 (21.28%) nurses were displeased with the assurance dimension; and 16 out of 47 nurses (34.04%) perceived the empathy dimension to be unsatisfactory.

SERVQUAL Results by Dimension

After analyzing the responses of the nurses for the SERVQUAL survey, the quantitative results by dimension are as follows:

Tangibility. The averaged SERVQUAL tangibility dimension perception score is a 3.72 out of a possible 5. This dimension also received the lowest dimension importance score of 14.57, which shows that this is the dimension of quality that holds the least amount of importance to the nurses. The nurses' perceptions of the hospital having current and visible policies for infectious disease, pulmonary disease, and pancreas and diabetes was lower than their expectations for these policies, which is reflected by the negative gap scores. The averaged unweighted gap score for nurses' responses for the tangibility dimension is -0.92. Since the tangibility dimension did not meet the 80% minimum satisfaction score and had a negative gap score of -0.92, this indicates that the nurses are dissatisfied with the available policies at the hospital being current and visible and the nurses' identified a gap in quality of the existing infectious disease, pulmonary disease, and pancreas and diabetes policies. When the dimension weight is multiplied with the unweighted gap score, the weighted gap score is a -13.40. A summary of the SERVQUAL survey tangibility dimension results is shown in Table 1.

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Table 1. Tangibility Dimension Results

Tangibility Dimension Statement	Average Expectation	Average Perception	Gap Score (P-E)
Question 1	4.68	3.81	-0.87
Question 2	4.60	3.79	-0.81
Question 3	4.64	3.55	-1.09
	Averaged Unweighted Gap Score		-0.92
	Dimension Weight		14.57
	Weighted Gap Score		-13.40

Reliability. The averaged SERVQUAL reliability dimension perception score is a 3.97 out of a possible 5. This dimension received the second lowest dimension importance score of 17.87. While the dimension did not quite meet the 80% satisfaction score threshold, the nurses appear to be satisfied overall with the reliability dimension aspects of the hospital being able to provide timely, accurate, and reliable services to the patients. However, the negative gap scores for each of the questions indicates that the nurses' perceptions are lower than their expectations of how reliable the hospital's services and treatments are. The averaged unweighted gap score for nurses' responses for the reliability dimension is -0.53, which indicates that there is a gap in quality of care between what the nurses expect from reliable services in the hospital to what they perceive reliability to be on the units. When the dimension weight is multiplied by the unweighted gap score, the weighted gap score is -9.47. A summary of the SERVQUAL survey reliability dimension results is presented in Table 2.

Table 2. Reliability Dimension Results

Reliability Dimension Statement	Average Expectation	Average Perception	Gap Score (P-E)
Question 4	4.49	3.77	-0.72
Question 5	4.62	4.60	-0.02
Question 6	4.28	3.64	-0.64
Question 7	4.57	3.85	-0.72
	Averaged Unweighted Gap Score		-0.53
	Dimension Weight		17.87
	Weighted Gap Score		-9.47

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Responsiveness. The averaged SERVQUAL responsiveness dimension perception score is a 3.65 out of a possible 5. This is below the necessary 80% perception satisfaction threshold and signifies that the nurses have a low level of satisfaction with the responsive aspects of personnel being willing to help patients and providing prompt, timely services and treatments to patients. Each of the three statements making up the responsiveness dimension received a negative gap score. The averaged unweighted gap score for all nurses' responses for the responsiveness dimension is -0.65. This suggests that there is an identified gap in quality of care of the nurses providing the components of the responsiveness dimension. When the dimension weight is multiplied with the unweighted gap score, the weighted gap score is -11.76. A summary of the SERVQUAL survey responsiveness dimension results is presented in Table 3.

Table 3. Responsiveness Dimension Results

Responsiveness Dimension Statement	Average Expectation	Average Perception	Gap Score (P-E)
Question 8	4.36	3.64	-0.72
Question 9	4.21	3.47	-0.74
Question 10	4.34	3.85	-0.49
	Averaged Unweighted Gap Score		-0.65
	Dimension Weight		18.09
	Weighted Gap Score		-11.76

Assurance. The averaged SERVQUAL assurance dimension perception score is a 4.17 out of a possible 5. This is above the 80% perception satisfaction limit, signifying that nurses are satisfied with the behavior of personnel instilling confidence and a feeling of safety in patients, staff being knowledgeable about CF, and nurses ability to answer disease-related questions patients with CF have. The assurance dimension also received the highest dimension importance weight of 29.26, indicating that this dimension is the most important to the nurses when identifying gaps in quality of care and services. However, for each of the three statements, the nurses' perceptions were lower than their expectations, which results in a negative gap score for each of the questions. The averaged unweighted gap score for nurses' responses for the assurance dimension is -0.72, which suggests that the nurses'

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perceptions of the assurance components are below their expectations of what should be happening.

When the dimension weight is multiplied with the unweighted gap score, the weighted gap score is -21.07. A summary of the SERVQUAL responsiveness dimension results is shown in Table 4.

Table 4. Assurance Dimension Results

Assurance Dimension Statement	Average Expectation	Average Perception	Gap Score (P-E)
Question 11	4.94	4.34	-0.60
Question 12	4.89	4.11	-0.79
Question 13	4.83	4.06	-0.77
	Averaged Unweighted Gap Score		-0.72
	Dimension Weight		29.26
	Weighted Gap Score		-21.07

Empathy. The averaged SERVQUAL empathy dimension perception score is a 4.33 out of a possible 5. This dimension also received the second highest dimension importance weight of 20.21. These suggest that the nurses have a high satisfaction level with the quality, attention, and individualized care that staff give patients, which they rank as being the second most important component of quality. However, the expectations of the nurses are higher than their perceptions of the empathy dimension components. This relationship is reflected by the negative gap scores of all four statements. The averaged unweighted gap score for all nurses' responses for the empathy dimension is -0.45, which implies that there is a gap in quality of care and the nurses' expectations of the empathy aspects are higher than their perceptions of what is occurring on the units. When the dimension weight is multiplied by the unweighted gap score, the weighted gap score is -9.09. A summary of the SERVQUAL survey responsiveness dimension results is presented in Table 5.

Table 5. Empathy Dimension Results

Empathy Dimension Statement	Average Expectation	Average Perception	Gap Score (P-E)
Question 14	4.70	4.43	-0.28
Question 15	4.81	4.74	-0.06
Question 16	4.87	3.87	-1.00
Question 17	4.74	4.28	-0.47
	Averaged Unweighted Gap Score		-0.45
	Dimension Weight		20.21
	Weighted Gap Score		-9.09

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Discussion

The article given to new nurses to read at orientation (George & Hazle, 2011) does not highlight the importance of treating the patient with CF as an individual that requires personal and individualized care and treatment. It does not elaborate upon the necessary effective communication required, the participation of patients in shared decision making, nor the crucial knowledge and skill set needed to provide the patient-centered, high quality, and safe care that patients with CF request. Therapeutic communication skills that address patient's fears and anxiety are not discussed, nor methods of how to align nursing practices to effectively and efficiently meet the needs of these patients taught. Confidence and trust in the knowledge, skills and abilities of the nurses providing direct patient care needs to be increased for patients with CF to feel that they are being well looked after during their hospital admissions, which is not addressed or conveyed in the article.

Summary

The overall perception of quality score that includes all five dimensions of the SERVQUAL survey is 3.97 out of a possible 5. While this is below the 80% minimum satisfaction threshold, it does indicate that the nurses are essentially satisfied with the tangibility, reliability, responsiveness, assurance, and empathy components of the quality of care that patients with CF receive. However, the negative gap scores in all five dimensions signify that their expectations for quality of care exceed their perceptions of what is being achieved on the units. The ranking of the gaps in quality of care for the five dimensions, from the largest to the smallest gap, are tangibility, assurance, responsiveness, reliability, and empathy.

When the gaps of quality of care scores are multiplied with the ranking of the dimension importance scores, the weighted gap score of each dimension is calculated. The weighted gap scores help to establish the significance between the expectation and perception gaps that were assessed in the quality improvement project. The weighted gap scores provide greater insight to the overall importance of the service quality dimension, where the greatest gap signifies the attribute that quality improvement

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initiatives should be targeted. The ranking of the weighted gap scores, from largest to smallest gap, are assurance, tangibility, responsiveness, reliability, and empathy. The new module must address each of these dimensions to provide comprehensive, evidence-based education and training on quality of care delivery to patients with CF to improve nurses' perceptions of CF quality of care and care delivery.

Interpretation

The quantitative analysis of the SERVQUAL survey found that although there are gaps in the expectations and perceptions of nurses regarding the quality of care patients with CF receive at the facility, generally the nurses are satisfied with the quality of service being delivered to patients. An 80% perception score threshold was determined to be the minimum score needed to determine true satisfaction with the tangibility, reliability, responsiveness, assurance, and empathy dimensions (Parasuraman, Zeithaml & Berry, 1988). Although this threshold was not achieved, the satisfaction score of 3.97 out of a possible 5 indicates a 79.4% satisfaction level with all five dimension aspects.

The negative gap scores suggest areas for improvement. In order to improve nurses' perceptions of the quality of care provided to patients with CF on the units, expanded education and training needs to be provided. Incorporating appropriate evidence-based research and practice into the education and training will increase the nurses' perceptions of quality of care and care delivery, which will ultimately enhance the quality of care given to patients with CF that are cared for on the units.

The analysis of the weighted gap scores indicates that the new CF educational module that is created to be given to nurses at their orientation should mainly focus on the assurance dimension. This dimension includes the knowledge and skills of hospital personnel and their ability to convey trust, safety, and confidence. The staff require more education and training in regards to CF as a chronic disease so they are able to adequately and knowledgeably answer disease-related questions that patients with CF have. The evidence found during the literature review supporting patients' with CF perceptions of high quality care and treatment should also be included. This evidence includes being aware of medication side effects, informing the patient about test results, and being knowledgeable

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about new medical developments in the treatment of CF. If patients with CF were able to discuss their fears and anxieties with nurses and receive accurate, educated responses about their chronic disease, confidence and trust in the nurses would increase. By demonstrating high quality, technical and clinical skills, nurses would exhibit the expertise that patients with CF require for their care and treatment.

The tangibility dimension components should also be included in the orientation module. For the purpose of this quality improvement project, the tangible components of CF care and treatment were related to the infectious disease, pulmonary disease, and pancreas and diabetes policies. These policies should remain current and visible and every staff member should be aware of how to access the policies and what each of the policies contains. Although the nurses do receive an email when the policies have been updated, many nurses expressed that they rarely have time to check their email. All of the policies are located at the same location within the organizations intranet, but the nurses seldom visit the site. More effective and efficient delivery of policy contents and updates is required to ensure that the nurses are familiar with and knowledgeable about all CF care policies.

The responsiveness factors of the personnel in the hospital being willing to help patients and providing prompt, on time services and treatments should also be included in the module to help improve the quality of care patients with CF receive at the hospital. The new CF educational module should focus less on the reliability and empathy dimension aspects, but they should also be included so the new nurse is given the most education and training necessary to provide high quality, evidence-based care and treatment to patients with CF.

Limitations

This quality improvement project provides a unique perspective into the expectations and perceptions of nurses regarding the quality of care provided to patients with CF at this healthcare facility. While this facility is an accredited CF Care Center, the results found may not be generalizable to other CF Care Centers found nationally or globally. The quality of care being provided to patients

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with CF by nurses at other CF Care Centers may be higher or lower depending on the education and training provided to the nurses during orientation and throughout their employment at their facility.

The SERVQUAL survey distributed to the nurses on the Medical Specialties Units focused specifically on the quality of care that patients with CF receive. Quality of care may be different for other acute or chronic diseases that the healthcare facility cares for and treats. Perceptions of high quality care may differ by healthcare setting or disease condition; therefore, the results from this individual SERVQUAL survey may not be generalizable to other acute or chronic diseases.

It cannot be excluded that different results may have been obtained if alternative statements were used. Differing expectations and perceptions may have been revealed if the survey statements were substituted with ones that still encompassed the specific dimension, but were asked differently or expressed another view of the dimension.

Although the SERVQUAL survey was available to all nurses providing direct patient care on the Medical Specialties Units of 1, 2, and 3 East, not all nurses completed and returned the survey. If the nurse did not work a day or night shift during the week that the survey was distributed, s/he did not have the opportunity to participate in the quality improvement project. Even though 78.3% (47 out of 60) of nurses did choose to participate and completed the SERVQUAL survey, the remaining 21.7% (13 out of 60) of nurses may have had different expectations and perceptions of quality of care, which could have affected the unweighted gap scores, dimension importance weights, weighted gap scores, and satisfaction levels. There were also a disproportionate percentage of female nurses that completed the survey over male nurses. This limitation could have affected the expectations and perceptions of quality of care by not incorporating sufficient male nurses' views of what high quality of care consists of; therefore, possibly influencing the subsequent gap analysis.

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Conclusion

This quality improvement project allowed the nurses that provide direct patient care to patients with CF on the Medical Specialties Units of 1, 2, and 3 East to express their expectations and perceptions of quality of care. Overall, the nurses' satisfaction with the quality of care being delivered to patients with CF on the Medical Specialties Units is positive. Despite this fact, gaps in quality of CF care and treatment still exist. The gap analysis identified specific dimension components that need to be expanded and taught to the nurses in order for high quality of care to be provided to patients with CF. The five dimensions included in the distributed SERVQUAL survey can be used in the planning and evaluation of appropriate healthcare delivery to improve the quality of care patients with CF receive. Research conducted of the perceptions of patients with CF should be incorporated into their care and treatments and should become an integral component of quality improvement initiatives to promote and enhance patient-centered care.

Future quality improvement projects should evaluate the effect of quality improvement interventions targeting patient experiences and perceptions on patient outcomes and quality of care. The SERVQUAL survey should be modified to include additional acute and chronic conditions that the facility cares for and treats in order to evaluate the expected and perceived quality of care for those diseases. Additional CF Care Centers should evaluate the quality of care patients with CF receive at their facility using the SERVQUAL survey tool. The results of the CF quality of care SERVQUAL surveys should be available to all accredited CF Care Centers. This will disseminate the expectation and perception levels of the personnel working at their facilities and the facility's quality improvement initiatives to improve the quality of care patients with CF receive. Patients' with CF perceptions of the quality of care received at this specific facility should also be determined. The perceptions and experiences of high quality of care might be slightly different in this population of patients than what was identified in the literature review.

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Clinical Nurse Leader Role

The Clinical Nurse Leader (CNL) is a leader in the healthcare delivery system that assumes accountability for patient care outcomes through the incorporation and application of research-based information to design, implement, and evaluate patient plans of care (AACN, 2007). Within this role, the CNL is responsible for the clinical management of comprehensive patient care (AACN, 2007). In order to provide high quality of care to patients with CF, the CNL is responsible for the planning of patient's contacts throughout the healthcare delivery system. This planning ensures that effective and efficient collaboration and communication is achieved between all healthcare providers that the patient encounters, improving the quality of care that the patient with CF receives and resulting in enhanced patient outcomes and satisfaction.

The CNL provides advocacy for patients, while assuming accountability for high quality delivery of care, the evaluation of patient care outcomes, and providing leadership for the improvement of care (AACN, 2007). The CNL partners with the patient to determine patient needs and requirements for high quality care delivery. By advocating for patients with CF and actively including them in the decision making process, the CNL ensures that the patients' with CF requirements and needs are included in their plans of care, which will ultimately improve their quality of care while in the hospital.

The role of educator and knowledge management includes the preparation of patients and their families for attaining self-care and achieving the highest level of functioning and well-being (AACN, 2007). The CNL incorporates evidence-based research and practice into the care and treatment delivered to patients. This helps patients with CF navigate through confusing and overwhelming information related to CF, which assists patients with accessing, understanding, and evaluating pertinent and applicable health-related information that is specific to their needs and requirements. By using appropriate teaching principles and strategies that are focused on CF, as well as incorporating current evidence-based research and practices, patients with CF will be taught appropriate wellness,

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health promotion, and risk reduction techniques that will help improve their quality of care while in the hospital and improve their quality of life overall.

In this project, the nurses were engaged to participate in quality improvement. The distributed survey and its detailed questions helped to increase nurse's self-awareness of the quality of care being given to patients with CF. The gap analysis results and dimension components will be incorporated into the new orientation module to provide comprehensive, evidence-based education and training on quality of care delivery. The expanded education and training will improve nurses' perceptions of CF quality of care and care delivery and help close the gaps found in this quality improvement project. The CNL will help to effect change through advocacy for the patient; will strive to achieve social justice within the CF Care Center's microsystem; assimilates and applies research-based information to design, implement, and evaluate patient plans of care; and attempts to achieve optimal patient and care environment outcomes to ensure that the highest level of quality of care is given.

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APPENDICES

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APPENDIX A

Quality of Care SERVQUAL Survey

My name is Alisha Nadeau and I am a student nurse working on my clinical immersion project at the hospital. For my project, I am interested in assessing the quality of care patients with cystic fibrosis (CF) receive. To do this, I need your help. I would like to find out what the nurses think about the care provided and how/ where the hospital could improve. Having been here for the past 5 months, I know you are all very busy. If you are able to take a few minutes to complete this survey, you will provide the data necessary to develop a new module for nurses at orientation about CF that will help to improve the quality of care patients with CF receive. The survey is completely anonymous and voluntary. Thank you for your time and consideration.

Based on your experiences as a nurse working in a hospital, please think about the kind of hospital that would deliver exceptional quality of care. Visualize the excellent type of services that would be provided, the ideal attention and support given, and the optimal level of patient-centered care.

Please show the extent to which you expect such a hospital would have the feature described by each statement. If you feel a feature is not at all essential for excellent hospitals such as the one you have in mind to deliver high quality of care, circle the number 1. If you feel a feature is absolutely essential to deliver high quality of care, circle 5. If your feelings are less strong, circle one of the numbers in the middle. There are no right or wrong answers- all I am interested in is the number that truly reflects your expectations regarding hospitals that would deliver exceptional quality of care.

	Not At All essential					Absolutely essential
	1	2	3	4	5	
1. Excellent hospitals will have a current and visible Infectious Disease Policy for patients	1	2	3	4	5	
2. Excellent hospitals will have a current and visible Pulmonary Disease Policy for patients	1	2	3	4	5	
3. Excellent hospitals will have a current and visible Pancreas and Diabetes Policy for patients	1	2	3	4	5	
4. When excellent hospitals promise to do something by a certain time, they will do so	1	2	3	4	5	
5. When a patient has a problem, excellent hospitals will show a sincere interest in solving it	1	2	3	4	5	
6. Excellent hospitals will get things right the first time	1	2	3	4	5	
7. Excellent hospitals will provide their services and treatments to patients at the time they promise to do so	1	2	3	4	5	
8. Personnel in excellent hospitals will deliver medications on time to patients	1	2	3	4	5	
9. Personnel in excellent hospitals will never be too busy to respond to requests made by patients	1	2	3	4	5	
10. Personnel in excellent hospitals will tell patients exactly when services and treatments will be performed	1	2	3	4	5	
11. The behavior of personnel in excellent hospitals will instill confidence and a feeling of safety in patients	1	2	3	4	5	
12. Personnel in excellent hospitals will be knowledgeable about chronic diseases and the policies related to these diseases	1	2	3	4	5	
13. Personnel in excellent hospitals will have the knowledge to answer disease-related questions patients with chronic disease have	1	2	3	4	5	

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	Not At All essential			Absolutely essential	
	1	2	3	4	5
14. Personnel in excellent hospitals will treat patients as unique individuals	1	2	3	4	5
15. Personnel in excellent hospitals will allow patients to be active participants in the decisions about their care and treatments	1	2	3	4	5
16. Personnel in excellent hospitals will effectively and efficiently communicate and collaborate between each other	1	2	3	4	5
17. Personnel in excellent hospitals will understand the specific needs of patients with chronic disease	1	2	3	4	5

Listed below are five features pertaining to hospitals and the services they offer patients.

I would like to know how important each of these features is to *you* when you evaluate the services offered by a hospital for a patient.

Please allocate a total of 100 points among the five features *according to how important each feature is to you*.

The more important a feature is to you, the more points you should allocate to it.

Please ensure that the points you allocate to the five features add up to 100.

1. The hospital having current and visible policies _____ points
2. The hospital's ability to perform promised services to patients on time, reliably, and accurately _____ points
3. The personnel in the hospital being willing to help patients and providing prompt, on time services and treatments _____ points
4. The knowledge and skills of hospital personnel and their ability to convey trust, safety, and confidence _____ points
5. The high quality, individualized care and attention hospital personnel give patients _____ points

TOTAL points allocated = 100 points

Which one feature of the above five is most important to you? _____ (enter the feature's number 1-5)

Which feature is second most important to you? _____

Which feature is least important to you? _____

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Now think about the quality of care that the hospital you currently work in gives to patients with CF. The following set of statements relate to your perceptions about how well the hospital is able to provide exceptional quality of care to patients with CF at the current time.

For each statement, please show the extent to which you believe the hospital has the feature described. Once again, circling a 1 means that you strongly disagree that the hospital has this feature and circling a 5 means that you strongly agree. You may circle any of the numbers in the middle that show how strong your feelings are. There are no right or wrong answers- all I am interested in is a number that best shows your opinion about the ability of the hospital you are currently working in to give exceptional quality of care to patients with CF at the current time.

	Strongly Disagree					Strongly Agree				
	1	2	3	4	5	1	2	3	4	5
1. The hospital does have a current and visible Infectious Disease Policy related to patients with CF	1	2	3	4	5					
2. The hospital does have a current and visible Pulmonary Disease Policy related to patients with CF	1	2	3	4	5					
3. The hospital does have a current and visible Pancreas and Diabetes Policy related to patients with CF	1	2	3	4	5					
4. When the hospital promises to do something by a certain time, it does so	1	2	3	4	5					
5. When a patient with CF has a problem, the hospital does show a sincere interest in solving it	1	2	3	4	5					
6. The hospital does get things right the first time	1	2	3	4	5					
7. The hospital does provide their services and treatments to patients with CF at the time they promise to do so	1	2	3	4	5					
8. Personnel in the hospital do deliver medications on time to patients with CF	1	2	3	4	5					
9. Personnel in the hospital are never too busy to respond to requests made by patients with CF	1	2	3	4	5					
10. Personnel in the hospital do tell patients with CF exactly when services and treatments will be performed	1	2	3	4	5					
11. The behavior of personnel in the hospital does instill confidence and a feeling of safety in patients with CF	1	2	3	4	5					
12. Personnel in the hospital are knowledgeable about CF as a chronic disease and the policies related to CF	1	2	3	4	5					
13. Personnel in the hospital do have the knowledge to answer disease-related questions that patients with CF have	1	2	3	4	5					
14. Personnel in the hospital do treat patients with CF as unique individuals	1	2	3	4	5					
15. Personnel in the hospital do allow patients with CF to be active participants in the decisions about their care and treatments	1	2	3	4	5					
16. Personnel in the hospital do effectively and efficiently communicate and collaborate between each other	1	2	3	4	5					
17. Personnel in the hospital do understand the specific needs of patients with CF	1	2	3	4	5					

THANK YOU FOR YOUR TIME AND RESPONSE

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APPENDIX B

Individual Responses of Completed SERVQUAL Surveys

Appendix B displays the individual responses from the 47 nurses who completed the SERVQUAL survey. Under each of the seventeen questions are the expectation (E) and perception (P) scores that the nurses assigned to the statements. The five dimensions of tangibility, reliability, responsiveness, assurance, and empathy are labeled above their corresponding statements. The perception scores that did not meet the 80% minimum satisfaction score (4 or 5 out of 5) are highlighted in red. The expectation and perception scores were used to calculate the average unweighted gap score.

	Tangibility						Reliability							Responsiveness							Assurance						Empathy									
	Ques 1		Ques 2		Ques 3		Ques 4		Ques 5		Ques 6		Ques 7		Ques 8		Ques 9		Ques 10		Ques 11		Ques 12		Ques 13		Ques 14		Ques 15		Ques 16		Ques 17			
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P				
Nurse 1	5	4	5	4	5	4	5	4	5	5	3	4	5	4	4	4	4	4	4	4	5	5	5	5	5	5	5	5	5	5	4	5	4	5	5	
Nurse 2	5	4	5	4	5	3	4	4	4	5	3	4	4	5	4	4	3	5	5	4	5	4	4	4	5	5	5	5	5	5	4	4	4	5		
Nurse 3	5	4	5	4	5	3	5	3	5	4	4	4	5	4	5	4	4	4	5	3	5	5	5	4	5	4	5	5	5	5	3	5	4			
Nurse 4	5	4	4	3	5	3	4	4	5	4	5	4	5	4	4	3	4	4	5	4	5	4	5	3	5	4	5	4	5	5	5	4	5	4		
Nurse 5	4	3	4	3	4	3	4	4	5	4	4	3	5	3	4	3	4	3	4	3	5	4	5	3	5	3	4	4	4	5	5	3	5	3		
Nurse 6	5	4	5	4	5	4	5	3	5	5	5	4	5	5	5	4	5	4	5	4	5	5	5	4	5	4	5	3	5	3	5	3	5	4		
Nurse 7	5	3	5	4	5	3	5	4	5	4	5	4	5	4	5	4	5	4	5	4	5	5	5	5	5	5	5	5	5	5	5	3	5	5		
Nurse 8	5	4	5	4	5	4	4	5	4	4	4	3	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4	5	4	4	4	4		
Nurse 9	5	4	5	4	5	4	5	4	5	4	5	3	5	3	5	3	5	3	5	3	5	5	5	5	5	5	5	5	5	5	4	5	3	5	5	
Nurse 10	4	4	4	3	5	3	5	3	5	5	3	3	4	4	4	2	3	3	5	4	5	5	5	4	5	5	4	4	5	5	5	5	5	5		
Nurse 11	5	3	5	3	5	3	4	4	4	5	4	3	5	3	5	3	5	3	4	4	5	4	5	4	5	4	5	4	5	4	5	4	5	4		
Nurse 12	4	3	4	4	4	3	5	4	5	4	5	4	5	4	5	2	5	4	3	4	5	4	5	4	5	3	5	4	4	5	5	3	4	4		
Nurse 13	5	4	5	4	5	4	5	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5	4	5	4	5	5	5	5	5	4	5	5		
Nurse 14	5	5	5	5	5	4	5	3	5	5	4	3	5	4	4	3	5	3	4	4	5	4	5	5	5	4	5	5	5	5	5	5	4	5	4	
Nurse 15	5	3	5	4	5	3	5	4	5	5	5	3	5	4	5	4	5	3	5	4	5	5	5	4	5	4	5	5	5	5	5	5	4	5	4	
Nurse 16	5	4	5	4	5	4	4	3	4	5	4	3	5	4	4	3	4	3	4	3	5	3	5	3	5	3	5	3	5	3	5	4	5	2	5	3
Nurse 17	5	5	4	4	4	4	5	3	4	5	4	4	5	3	3	4	4	3	4	3	5	3	5	3	4	4	5	5	5	5	5	4	5	4		
Nurse 18	5	5	5	2	5	5	3	2	5	5	5	4	4	2	4	4	5	4	5	5	5	5	5	4	4	4	5	5	5	5	5	4	5	4		
Nurse 19	4	3	4	4	4	3	4	4	4	5	4	4	4	4	4	3	4	3	4	4	4	5	4	4	4	4	4	4	5	4	5	4	3	4	4	
Nurse 20	4	3	4	4	4	3	5	4	5	5	5	4	5	4	5	3	5	3	5	4	5	4	5	4	5	4	5	4	5	5	5	4	5	5		
Nurse 21	5	3	5	3	5	3	5	4	5	5	5	4	5	4	5	3	5	3	5	3	5	4	5	4	5	4	5	4	5	4	5	4	5	4		
Nurse 22	4	4	4	4	4	4	5	3	5	3	4	3	5	2	5	3	5	2	4	2	5	5	5	4	5	4	5	5	4	5	5	5	5	4		
Nurse 23	5	4	5	4	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	
Nurse 24	5	5	5	5	5	5	5	5	5	4	3	3	5	4	3	2	3	2	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	

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	Tangibility						Reliability							Responsiveness						Assurance						Empathy									
	Ques 1		Ques 2		Ques 3		Ques 4		Ques 5		Ques 6		Ques 7		Ques 8		Ques 9		Ques 10		Ques 11		Ques 12		Ques 13		Ques 14		Ques 15		Ques 16		Ques 17		
	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P	E	P			
Nurse 25	5	5	5	4	5	4	4	4	5	5	5	5	4	4	5	4	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5			
Nurse 26	5	3	5	4	5	3	5	4	5	5	5	4	5	5	5	3	5	3	5	4	5	3	5	3	5	3	5	3	5	5	5	3	5	4	
Nurse 27	4	3	4	3	4	3	5	4	5	4	4	2	5	3	4	3	4	2	5	3	5	3	5	3	4	4	5	5	5	3	5	3			
Nurse 28	4	4	4	4	4	4	3	4	4	4	3	4	3	4	3	4	3	4	3	4	5	4	5	4	5	4	4	4	4	4	5	4	3	4	
Nurse 29	3	2	3	2	3	2	5	3	5	4	3	3	4	4	5	4	4	4	5	5	4	4	4	5	5	4	5	5	5	5	5	4	4	4	
Nurse 30	5	5	5	5	5	5	4	3	5	4	4	3	4	3	4	3	4	4	4	3	5	4	5	5	5	4	5	4	5	5	5	4	5	5	
Nurse 31	4	3	3	5	3	3	3	3	3	5	3	3	3	3	3	4	3	3	3	3	5	5	5	5	5	4	5	5	5	5	5	4	5	4	
Nurse 32	3	3	3	1	3	1	4	3	4	4	3	4	5	4	4	4	3	4	4	3	5	4	5	4	5	4	2	3	5	5	4	4	4	5	
Nurse 33	4	3	4	3	4	3	4	4	4	5	4	4	4	4	4	4	3	4	4	5	4	5	4	5	4	5	4	5	5	5	3	5	4	4	
Nurse 34	5	4	4	4	4	4	3	2	4	4	4	4	4	2	4	4	3	2	4	2	5	4	5	4	5	4	5	3	5	5	4	4	4	4	
Nurse 35	5	4	5	4	5	4	5	4	4	5	4	4	4	4	4	4	3	4	3	4	5	4	5	4	4	4	4	5	5	5	5	4	4	4	4
Nurse 36	5	3	5	3	5	3	5	3	5	3	5	3	5	3	5	2	5	2	5	3	5	3	5	2	5	2	5	3	5	3	5	3	5	2	
Nurse 37	5	4	5	4	5	4	5	4	5	5	5	3	5	4	5	3	5	3	5	4	5	4	5	3	5	3	5	4	5	5	5	3	5	3	
Nurse 38	5	4	5	4	5	4	5	4	5	5	5	5	5	5	5	4	5	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Nurse 39	5	5	5	5	5	5	3	4	4	5	3	4	3	4	4	5	4	4	4	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Nurse 40	5	5	5	5	5	4	5	5	5	5	5	3	5	4	5	5	5	5	5	5	5	5	5	4	5	5	5	5	5	5	5	5	5	5	5
Nurse 41	5	3	5	4	5	3	5	5	5	5	5	4	5	5	5	4	5	3	5	4	5	5	5	5	5	5	5	5	5	5	4	5	3	5	5
Nurse 42	5	3	5	3	5	2	3	3	4	4	5	2	4	3	4	5	3	3	2	5	5	5	5	4	5	4	5	5	5	5	5	5	4	5	5
Nurse 43	5	4	5	4	5	4	5	5	5	5	5	4	5	4	5	3	5	3	5	4	5	3	5	3	5	3	5	5	5	5	5	4	5	5	5
Nurse 44	5	4	5	4	5	4	5	3	4	5	4	4	4	4	4	4	3	4	3	4	5	4	5	4	4	4	4	5	4	5	4	4	4	4	4
Nurse 45	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Nurse 46	5	4	5	3	5	3	5	3	4	4	3	3	4	4	3	4	3	3	3	3	5	4	4	4	4	4	4	4	4	4	4	5	4	4	4
Nurse 47	4	4	4	4	4	4	4	4	4	5	5	4	5	4	4	4	4	3	4	4	5	4	5	4	5	4	4	4	4	5	5	4	5	4	4