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# Patient evaluations of the interpersonal care experience (ICE) in U.S. hospitals: A factor analysis of the HCAHPS survey

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# Patient evaluations of the interpersonal care experience (ICE) in U.S. hospitals: A factor analysis of the *HCAHPS* survey

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## Abstract

The Hospital Consumer Assessment of Healthcare Providers and Systems survey (*HCAHPS*) is widely used to evaluate patients' perceptions of their inpatient healthcare experiences. The *HCAHPS* is organized into 10 measures: six composite measures, two individual measures, and two global measures.[1] In prior research on the link between patients' care experiences and hospital's quality and cost outcomes, scholars have grouped these measures in a variety of ways. The evident lack of consistency in these groupings along with the persistent lack of empirical justification for these groupings suggests a need to empirically examine the relational structure of *HCAHPS* measures. Accordingly, the purpose of this study is to determine the degree to which patient care evaluations captured by HCAHPS reflect unmeasured aspects of the patient experience. We use two-step factor analytic process on a nationally representative split sample of *HCAHPS* performance from 2007-2011. The results of the analysis reveal a single latent factor consisting of five measures that correspond conceptually to patients' evaluations of care provider behaviors during their interpersonal interactions with them. We label this factor Interpersonal Care Experience (I.C.E) and argue that it may prove useful in future practical and scholarly explorations of the link between patient experience and other performance outcomes.

## Keywords

HCAHPS, patient satisfaction, patient centered care, factor analysis

## Introduction

The Hospital Consumer Assessment of Healthcare Providers and Systems survey (*HCAHPS*) is among the most widely used instruments for evaluating patient experience in U.S. hospitals.[1] The development and national implementation of *HCAHPS* is a direct response to the combined efforts of hospital administrators, health care policy makers, and scholars to include patient's evaluation of their care experiences among nationally reported quality measures.[2,3,4] The public availability of *HCAHPS* measures facilitates comparisons across hospitals and health care delivery systems, making it germane not only to healthcare policy and delivery, but also potentially to consumer decision-making processes.[5,4,6,7]

The purpose of this study is to determine the degree to which variation in *HCAHPS* evaluations reflects underlying, unmeasured aspects of the patient care experience. Prior studies have grouped *HCAHPS* measures based either on their conceptual similarity (i.e., communication-based measures) or empirical analysis of single year, cross-sectional *HCAHPS* data.[8,9] Moreover, these groupings lack consistency, suggesting the need for a more systematic evaluation of the relational structure of HCAHPS measures. Accordingly, we empirically evaluate

*HCAHPS* measures over an extended period of time. In doing so, our purpose is to identify the latent structure of *HCAHPS* measures and observe the extent of stability in this structure over time. We employ a two-step factor analytic process on a nationally representative, randomly split sample of *HCAHPS* performance from 2007-2011. The results of our analysis suggest the presence of a single latent factor consisting of five *HCAHPS* measures that conceptually correspond to the interpersonal aspects of the patient care experience.

## Background

*HCAHPS* consists of 27 individual-level survey items that are reported as 10 hospital-level measures.[1] Eight measures address specific aspects of the care experiences: the communication of physicians (Docs), the communication of nurses (Nurses), communication about medicines (Meds), the responsiveness of providers (Responsive), control of pain (Pain), the cleanliness of the hospital environment (Clean), the quietness of hospital environment (Quiet), and discharge instructions (Discharge). The remaining measures ask patients about their overall satisfaction with the hospital (Overall) and their likelihood to recommend the hospital to a close friend or family member (Recommend).[1]

Patient experience studies often examine individual *HCAHPS* measures according to the specific aspect of care under consideration.[10-25] Primarily, however, scholars have elected to focus their attention on the overall ratings, frequently citing the high level of correlation among *HCAHPS'* measures[10] as justification for omitting the other measures altogether. In essence, prior research has collectively conceptualized these global ratings (Overall and Recommend) as either (i) summary measures of a patient's satisfaction with the individual aspects of their care experience[26-32], or (ii) superior measures of a patient's experience that supersede perceptions of the individual aspects of the care experience. In doing so, however, scholars may be sacrificing important information and may be forgoing opportunities to learn from the specific, actionable aspects of the patient care experience that the individual measures address.

In an effort to appreciate the value of the individual measures, recent studies have sought to group these *HCAHPS* measures in meaningful ways. However, the *HCAHPS* groupings that these studies have produced are notably inconsistent.[8,9] For example, Senot et al.[8] grouped six *HCAHPS* measures (Docs, Nurse, Pain, Responsive, Meds, and Discharge) based on the perceived conceptual similarity of these composite measures as relating to "experiential" aspects of the patient's experience. Another study by Westbrook et al.[9] used a confirmatory factor analysis on a single year of data and found a three-factor solution: Hospital Environment (Clean and Quiet), Communication with Patients (Docs, Nurses, Meds, and Discharge), and Responsiveness to Patient Needs (Responsive and Pain). We build on these studies by designing a two-step empirical process that allows us to both explore the structure of the data and confirm emerging patterns over several years of data. In so doing, we seek to strengthen our collective understanding of the patient care experience as reflected in the HCAHPS measures.

## Analytic Approach

This study utilizes a two-step factor analytic process applied to a sample of hospitals, randomly split into two sub-samples. An exploratory factor analysis (EFA) is first applied to one sub-sample for hypothesis development. A confirmatory factor analysis (CFA) is subsequently applied to the other sub-sample for hypothesis testing. One advantage of this approach is that the EFA proceeds absent a hypothesis, without fitting a pre-determined factor model, reducing the potential for researcher bias. In this way, the EFA allows for latent factors underlying the *HCAHPS* measures to emerge from the data, while the CFA confirms (or not) the structure of the data on a different sub-sample. Additional analysis is included to ensure the robustness of the study's findings. All factor analytic methods were administered in a repeated cross-sectional fashion.

### Data

The study data consists of sixteen *HCAHPS* quarterly releases spanning from 2007 to 2011. For each year and quarter, *HCAHPS* measures are operationalized as the percentage of patients that indicated a "top-box" survey response of "9 or above" or "would definitely recommend". The two study sub-samples were each drawn from the sample of hospitals that participated in the initial public release of the *HCAHPS* and the fifteen subsequent releases (total n=2,375). The first sub-sample (EFA sub-sample) and the second sub-sample (CFA sub-sample) were drawn based on random assignment. A total of 10 hospitals in the EFA sub-sample (final $n_1$= 1,178) and 9 hospitals in the CFA sub-sample (final $n_2$=1,178) were omitted due to substantial missing data.

## Step 1: Exploratory Factor Analysis

### Methods

Each cross-section of the EFA was modeled with maximum likelihood estimators to rotate around the number of factors suggested by its scree plot (scree test) to avoid incorrect specification regarding the number of factors.[33] These scree tests resulted in 1, 2, or 3 factors, confirming the notion that the factor structure may oscillate over time. In addition, oblique factor rotations were specified to allow for correlations that exist among latent factors as correlation amongst factors is generally expected in social science research (e.g., education and intelligence levels).[33] An example of this in the present study is the high level of correlation between patient's overall satisfaction with their care experience (Overall) and their likelihood to recommend the hospital to a family member or friend (Recommend).

### Results

A summary of the EFA sub-sample ($n_1$=1,178), including the correlations amongst the *HCAHPS* measures is shown in Tables 1. The results of the EFA on a sample covering all 16 quarterly releases are presented in Table 2 showing the average factor loading scores and uniqueness for each variable as well as the average eigenvalue for each identified factor. Factor loading scores at or above 0.7 are bolded as this level indicates a strong relationship between the measure and an underlying factor.[33] Factors with an eigenvalue of at least 1 and a minimum of three variables loading at or above the established strength of 0.7 on average are considered reliable.[33] Thus, the results of the EFA indicate the existence of an underlying factor amongst the *HCAHPS* measures, Factor 1, which exhibits an average eigenvalue of 4.94 and five variables loading at or above 0.7.

As an additional test of the longitudinal reliability of the

**Table 1. EFA HCAHPS Sub-section Summary and Correlations**

|  | Obs. | Mean | S.D. | Min | Max | Doc | Nur | Res | Med | Pn | Qt | Cln | Dis | Ovr | Rec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Doctors | 18,848 | 79.38 | 5.15 | 55 | 100 | 1.00 | | | | | | | | | |
| Nurses | 18,848 | 74.44 | 6.13 | 46 | 98 | **0.78** | 1.00 | | | | | | | | |
| Responsive | 18,848 | 61.96 | 8.38 | 31 | 96 | 0.69 | **0.85** | 1.00 | | | | | | | |
| Medicines | 18,848 | 58.96 | 6.41 | 30 | 100 | **0.72** | **0.82** | **0.74** | 1.00 | | | | | | |
| Pain | 18,848 | 68.29 | 5.38 | 42 | 98 | **0.73** | **0.85** | **0.75** | **0.76** | 1.00 | | | | | |
| Quiet | 18,848 | 55.22 | 9.63 | 26 | 91 | 0.63 | 0.58 | 0.54 | 0.56 | 0.56 | 1.00 | | | | |
| Cleanliness | 18,848 | 69.39 | 7.67 | 40 | 95 | 0.57 | **0.71** | **0.72** | 0.63 | 0.61 | 0.49 | 1.00 | | | |
| Discharge | 18,848 | 81.03 | 4.97 | 58 | 100 | 0.38 | 0.55 | 0.47 | 0.56 | 0.52 | 0.25 | 0.41 | 1.00 | | |
| Overall | 18,848 | 65.40 | 8.83 | 13 | 97 | 0.59 | **0.78** | 0.67 | 0.67 | **0.72** | 0.52 | 0.62 | 0.57 | 1.00 | |
| Recommend | 18,848 | 68.67 | 9.55 | 20 | 99 | 0.48 | 0.65 | 0.52 | 0.57 | 0.63 | 0.39 | 0.48 | 0.53 | **0.90** | 1.00 |

**Table 2. EFA Average Factor Loading**

| HCAHPS Sub-sections $n_1$=18,848 | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 | Factor 6* | Uniqueness |
|---|---|---|---|---|---|---|---|
| Doctors | **0.69** | 0.10 | 0.23 | 0.08 | -0.06 | 0.02 | 0.22 |
| Nurses | **0.79** | 0.16 | 0.10 | 0.01 | -0.04 | -0.01 | 0.05 |
| Responsive | **0.72** | 0.14 | 0.07 | -0.01 | 0.08 | 0.00 | 0.13 |
| Medicines | **0.75** | 0.09 | 0.10 | 0.16 | 0.08 | 0.03 | 0.13 |
| Pain | **0.70** | 0.16 | 0.14 | 0.08 | 0.01 | 0.02 | 0.19 |
| Quiet | 0.49 | 0.16 | 0.27 | 0.06 | 0.01 | -0.02 | 0.30 |
| Cleanliness | 0.59 | 0.16 | 0.08 | -0.00 | 0.09 | 0.06 | 0.30 |
| Discharge | 0.39 | 0.16 | 0.04 | 0.09 | 0.12 | 0.06 | 0.44 |
| Overall | 0.51 | 0.44 | 0.03 | -0.01 | 0.00 | 0.00 | 0.03 |
| Recommend | 0.35 | 0.48 | 0.01 | 0.02 | 0.03 | 0.00 | 0.09 |
| Eigenvalue | **4.94** | 1.31 | 0.61 | 0.37 | 0.20 | 0.08 | |

*-Factor 6 not present in all analyses

EFA results, the frequency with which each measure loads onto an underlying factor across the 16 quarterly releases is presented in Table 3 (i.e., the factor analysis was run 16 times on each quarterly release). Docs, Nurses, Pain, Responsive, and Meds each display a strong and consistent relationship to Factor 1, with each loading strongly in at least 11 of the 16 cross-sections. Thus, the results of the EFA suggest the strong possibility of an underlying factor in the HCAHPS measures that associate strongly with the Docs, Nurses, Pain, Responsive, and Meds measures.

**Step 2: Confirmatory Factor Analysis**

*Hypothesis*
The hypothesis to be tested in the CFA is based on the results of the EFA and is informed by a review of the contents of the individual HCAHPS measures. The EFA results suggest the existence of an underlying factor amongst the HCAHPS measures that relates to Docs, Nurses, Pain, Responsive, and Meds measures in a consistent and significant manner, with an average eigenvalue of 4.94. In seeking to understand the nature of

this underlying factor, addressing the content of the questions on which these measures are based helps to conceptualize the aspects of the care experience patients may be reacting to.

Overall and Recommend are each considered global ratings, capturing patients' general evaluations of their overall care experience. Clean and Quiet address environmental aspects of the experience while Discharge relates to the information received when leaving the hospital. These questions are conceptually distinct form those that focus on the direct provision of care and interactions with care providers. Specifically, Docs and Nurses assess the quality of the interactions between patients and their providers, including affect and communication. Similarly, Meds relates to the quality of provider interactions regarding medications. Finally, Responsive and Pain relate to how well providers interact with patients in terms of helpfulness and pain management. In both cases, the measures evaluate the extent of provider responsiveness to patient needs.

In Figure 1 we present the HCAHPS survey questions related to these latter five composite measures. We

**Table 3 EFA Factor Loading Frequency ≥ 0.7**

| $n_1$=18,848<br>HCAHPS Sub-sections | Factor 1 | Factor 2 | Factor 3 | Factor 4 | Factor 5 | Factor 6* |
|---|---|---|---|---|---|---|
| Doctors | **11** | | | | | |
| Nurses | **12** | | | | | |
| Responsive | **12** | 1 | | | | |
| Meds | **12** | | | | | |
| Pain | **11** | | | | | |
| Quiet | | 1 | | | | |
| Clean | 7 | | | | | |
| Discharge | | | 1 | | | |
| Overall | 7 | 6 | 2 | | | |
| Recommend | 4 | 8 | 1 | | | |
| Eigenvalue | **4.94** | 1.31 | 0.61 | 0.37 | 0.20 | 0.08 |

present the text of the questions just as patients completing HCAHPS would see them, including the emphasis on underlined words (i.e., courtesy and respect, listened to you carefully). These questions collectively highlight the degree to which care providers' interactions with patients convey courtesy, respect, and a willingness to listen to and respond to their needs and preferences. Thus, the conceptual similarity of these measures further insight into why Docs, Nurses, Responsive, Pain, and Meds appear to vary together.

Early patient satisfaction work conceptualized patients' evaluations of their care experiences as influenced, in part, by the processes of care, specifically, the technical and interpersonal aspects of care.[2] Provider communication, patient-centered decision-making, and interpersonal style have been identified as key aspects of the interpersonal care process[34, 35] and confirmed as influential in patients' evaluation of their care.[36] Prior work has also shown that patient evaluations are responsive to being treated with respect and dignity and the compassion with which care was provided.[36-38] The questions feeding the five HCAHPS measures loading onto factor 1 in our EFA relate to these aspects of the patient's interpersonal care experience. We therefore hypothesize that patients' evaluations of their care experiences reflect a single latent factor consisting of the five measures in Figure 1.

**Figure 1 Questions for loading HCAHPS measures**

| Communication of Doctors | Communication of Nurses | Responsiveness of Staff | Pain Management | Communication about Medicine |
|---|---|---|---|---|
| During this hospital stay, how often did doctors treat you with courtesy and respect? | During this hospital stay, how often did nurses treat you with courtesy and respect? | During this hospital stay, did you need help from nurses or other hospital staff in getting to the bathroom or in using a bedpan? | During this hospital stay, how often was your pain well controlled? | During this hospital stay, were you given any medicine that you had not taken before? |
| During this hospital stay, how often did doctors listen carefully to you? | During this hospital stay, how often did nurses listen carefully to you? | How often did you get help in getting to the bathroom or in using a bedpan as soon as you wanted? | During this hospital stay, did the hospital staff do everything they could to help you with your pain? | Before giving you any new medicine, how often did hospital staff tell you what the medicine was for? |
| During this hospital stay, how often did doctors explain things in a way you could understand? | During this hospital stay, how often did nurses explain things in a way you could understand? | | | Before giving you any new medicine, how often did hospital staff describe possible side effects in a way you could understand? |
| | During this hospital stay, after you pressed the call button, how often did you get help as soon as you wanted it? | | | |

Source: www.HCAHPSonline.org/surveyinstrument

*Hypothesis: The HCAHPS measures: <u>Docs</u>, <u>Nurses</u>, <u>Responsive</u>, <u>Pain</u>, and <u>Meds</u> will load onto a single factor reflecting the interpersonal care experience.*

## Methods

The CFA was administered using the confa command in STATA, version 11.[39] The CFA freely estimates factor loadings using maximum likelihood with initial parameters for each of the variables set to 1 as the variance of each observed variable is close to 1 with positive covariance.[39] To conduct the CFA, an initial parameter must be selected in order to identify the underlying factor. <u>Nurses</u> was selected as the initial parameter based on the level of nurse involvement in many of the tasks and behaviors associated with the *HCAHPS* measures hypothesized as being related to the underlying factor and based on the strength of <u>Nurses</u> relationship to the underlying factor in the EFA.

## Results

A summary of the CFA sub-sample including correlations among the *HCAHPS* is shown in Table 4. The results of the CFA provide evidence in favor of the existence of an underlying factor related to the interpersonal care experience. The average results of the CFAs across the sixteen cross-sections are presented in Table 5 and indicate that <u>Docs</u>, <u>Nurses</u>, <u>Pain</u>, <u>Responsive</u>, <u>Meds</u> and <u>Overall</u> load onto a single factor. The unstandardized scores are presented with the standard error as well as the standardized score. In addition, the corresponding r-squared is presented to show the extent to which the underlying factor can explain the variance of the *HCAHPS* measure. The model produced an average Goodness-of-fit of 35.93 and Chi-squared of 0.00. A strong relationship between an *HCAHPS* measure and the underlying factor is determined based on the variable having both an average unstandardized coefficient and an average r-squared greater than or equal to 0.6. As the initial parameter, <u>Nurses</u> is mechanically predetermined to have an unstandardized coefficient of 1. These criteria

assert that both the level of the measure's performance is determined by performance in the underlying factor and that a significant portion (≥78%) of the variation in the measure is attributable to the underlying factor.

## Sensitivity Analysis

An additional analysis was undertaken to investigate whether the underlying factor's relationship holds independent of patient's overall satisfaction. First, a bivariate regression between <u>Overall</u> and each of the measures was executed to calculate a residual for each measure (i.e. the variation in each measure that is related to <u>Overall</u> was removed). <u>Recommend</u> was omitted from this analysis based on its correlation to <u>Overall</u> exceeding 0.9. Then, the residuals of each measure were analyzed via an EFA across the sixteen cross-sections. The average results of this additional sensitivity analysis are presented in Table 6.

All residuals held a positive average relationship to Factor 1, which showed an average eigenvalue of 3.32. Once again, a single underlying factor is suggested by the results of the residual EFA with 5 of the *HCAHPS* measure residuals holding a strong relationship to Factor 1 at or above 0.69. These results provide strong evidence to suggest that the results of our analysis are not sensitive to variation in a patient's overall level of satisfaction. In other words, they suggest that the loading of <u>Overall</u> onto the hypothesized factor in the CFA is an artifact of the underlying factor, not a driver of it.

## Discussion

The results of the analyses support the existence of an underlying factor in patients' evaluation of their care experiences as reflected in five composite HCAHPS measures: the communication of physicians, the communication of nurses, the responsiveness of staff, pain management and communications about medicines. Although the identified factor is associated with patient's overall satisfaction with their care experiences, the results

## Table 4. CFA *HCAHPS* Sub-section Summary and Correlations

|  | Obs. | Mean | S.D. | Min | Max | Doc | Nur | Res | Med | Pn | Qt | Cln | Dis | Ovr | Rec |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Doctors | 18,848 | 79.23 | 5.19 | 46 | 100 | **1.00** | | | | | | | | | |
| Nurses | 18,848 | 74.29 | 6.17 | 36 | 98 | **0.78** | **1.00** | | | | | | | | |
| Responsive | 18,848 | 61.57 | 8.31 | 18 | 95 | **0.71** | **0.85** | **1.00** | | | | | | | |
| Medicines | 18,848 | 58.85 | 6.31 | 17 | 96 | **0.73** | **0.82** | **0.74** | **1.00** | | | | | | |
| Pain | 18,848 | 68.24 | 5.40 | 38 | 99 | **0.73** | **0.85** | **0.76** | **0.76** | **1.00** | | | | | |
| Quiet | 18,848 | 54.85 | 9.62 | 28 | 98 | 0.63 | 0.59 | 0.57 | 0.56 | 0.58 | **1.00** | | | | |
| Cleanliness | 18,848 | 69.14 | 7.85 | 32 | 100 | 0.57 | **0.71** | **0.73** | 0.64 | 0.61 | 0.52 | **1.00** | | | |
| Discharge | 18,848 | 81.12 | 4.96 | 54 | 99 | 0.39 | 0.55 | 0.46 | 0.54 | 0.50 | 0.28 | 0.39 | **1.00** | | |
| Overall | 18,848 | 65.35 | 8.59 | 33 | 100 | 0.61 | **0.79** | 0.68 | 0.69 | **0.73** | 0.57 | 0.63 | 0.59 | **1.00** | |
| Recommend | 18,848 | 68.83 | 9.31 | 28 | 100 | 0.51 | 0.66 | 0.52 | 0.58 | 0.64 | 0.44 | 0.47 | 0.54 | **0.91** | **1.00** |

**Table 5. CFA *HCAHPS* Sub-sections Average Results**

| n₂=18,848<br>*HCAHPS* Sub-Sections | Unstandardized Coefficient | Std. Error | Standardized (Z) | R-Squared |
|---|---|---|---|---|
| Nurses | **1** | . | . | **0.91** |
| Pain | **0.81** | 0.02 | 52.85 | **0.77** |
| Responsiveness | **1.26** | 0.03 | 52.01 | **0.76** |
| Doctors | **0.73** | 0.02 | 42.76 | **0.65** |
| Medicines | **0.92** | 0.02 | 48.16 | **0.72** |
| Quiet | 1.08 | 0.04 | 27.10 | 0.41 |
| Clean | 1.00 | 0.03 | 34.45 | 0.54 |
| Discharge | 1.00 | 0.02 | 21.86 | 0.31 |
| Overall | **1.23** | 0.03 | 44.71 | **0.69** |
| Recommend | 1.14 | 0.04 | 31.78 | 0.50 |
| | Goodness-of-Fit | Test v. Indep | Chi-sq. | Log Likelihood |
| | 2041.55 | 9324.89 | 0.000 | -34689.51 |

of sensitivity analysis suggest that the relationship amongst these measures is maintained independent of patients' evaluation of their overall level of satisfaction. The results of this study provide meaningful insight into how patients may be evaluating the care they receive.

Notably, the measures that load onto the identified factor not only group together empirically, but also group together conceptually. Each of these measures asks patients to evaluate their care providers' behaviors during interpersonal aspects of the care experience, as outlined in Figure 1. This conceptual link between the loading measures complements the empirical relationships we have observed, lending additional strength to the conclusion that patients' evaluations of their experience are responding to a latent, underlying characteristic of the care they receive. We label this aspect of the patient's experience the *interpersonal care experience (ICE).*

Although efforts have taken steps to ensure the validity of our empirical results, this study is not without limitations. As the sample of hospitals consisted of those that reported their *HCAHPS* results in the initial public reporting period, our sample is not random and the potential exists that these hospitals are different in meaningful ways from non-reporting hospitals. The use of factor analysis also introduces potential limitations to the study findings. In particular, confirmatory factor analysis presents a potential to "create" latent variables rather to discover latent aspects amongst variables.[40] However, our use of exploratory factor analysis for hypothesis development and the use of independent samples mitigate against this potential threat. Finally, despite the longitudinal nature of the data, our factor analyses were not conducted longitudinally. Nevertheless, the use of an extended period of time allowed us to see whether and how cross-sectional analyses vary over time. Notably, our trend analysis did

**Table 6. Residual EFA Average Factor Loading**

| n₂=18,848<br>*HCAHPS*<br>Sub-sections | Factor 1 | Factor 2 | Factor 3 | Factor 4* | Uniqueness |
|---|---|---|---|---|---|
| Doctors | **0.71** | -0.13 | -0.02 | -0.01 | 0.44 |
| Nurses | **0.85** | 0.09 | -0.04 | -0.04 | 0.26 |
| Responsiveness | **0.71** | 0.15 | -0.01 | 0.03 | 0.45 |
| Medicines | **0.69** | 0.07 | -0.05 | -0.05 | 0.48 |
| Pain | **0.78** | -0.03 | 0.02 | 0.00 | 0.34 |
| Quiet | 0.54 | -0.09 | 0.09 | 0.05 | 0.61 |
| Cleanliness | 0.43 | -0.29 | 0.07 | 0.04 | 0.68 |
| Discharge | 0.15 | 0.34 | -0.03 | 0.04 | 0.84 |
| Eigenvalue | 3.32 | 0.33 | 0.22 | 0.03 | |

*-Factor 4 not present in all analyses

not produce any noteworthy findings.

This study produces several opportunities for further research. Most simply, our results suggest the potential for an additional way conceptual lens through which to understand and measure the patient experience. For example, previous studies have indicated the ability for hospital management and administrative practices to positively influence patient experience improvement.[24,30,32] Perhaps examination of this relationship through the lens of ICE could be useful in deciphering the mechanisms involved in these relationships. In addition, our findings suggest that *HCAHPS* may be useful not only for evaluating hospital performance with respect to patient satisfaction, but also for measuring a hospital's character and capabilities with respect to the interpersonal aspects of care delivery. In this way *ICE* can be used in a variety of ways, including the continued exploration of the relationship between the technical aspects of care, including those related to cost and quality outcomes, and the interpersonal aspects of care.[6] From this perspective, *HCAHPS* data (and *ICE* in particular) might prove useful in building a better understanding of the organizational behaviors and processes that facilitate learning and improvement more generally (not just when it comes to patient satisfaction). Moreover, while previous studies have treated *HCAHPS* as a "performance" measure that may be influenced by organization and system-level characteristics,[19] the nature of the underlying factor we have observed suggests that *HCAPHS* results may reflect an organizational characteristic itself (e.g., compassion capabilities), as much as it reflects performance. Future research should explore this possibility.

## Conclusion

The analysis we have presented contributes to the literature on patient experience of care and its measurement via *HCAHPS*. First, our study identifies a single factor in the patient's evaluation of care. This factor is both empirically and conceptually related to the interpersonal aspects of the care experience. More specifically, the factor consists of five loading measures: Docs, Nurses, Responsive, Pain, and Meds appear to be perceived and evaluated by patients as a singular aspect of their care experience, an aspect that we have labeled the *interpersonal care experience* (ICE).

The findings of this study are relevant not only to the study of health care policy and measurement, but also to the practice of management. For managers, improvement of patient experience is paramount, for both competitive and reimbursement (e.g., value-based purchasing) related reasons. Our study suggests that there may be value in reframing these improvement efforts. More specifically, rather than simply addressing individual aspects of the

patient care experience separately, our findings suggest that a collective approach may be beneficial. For example, such an approach may offer potential cost savings, by reducing the administrative burden associated with managing and overseeing multiple improvement projects. Such an approach may also be beneficial for focusing the collective efforts of caregivers and enabling more widespread organizational attention towards patients' interpersonal care experiences.

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