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An Instrument Development Study

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ABSTRACT

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Background: Previous research has identified four distinct developmental stages associated with organizational learning in high-performing hospital units: identity and ownership, team and respect, accountability and support, and reliability and sustainability. We designed a research instrument to measure these constructs. The purpose of this thesis was to establish the content and predictive validity of this instrument.

Methods: The Organizational Learning Development Instrument (OLDI) consists of a total of 35 items in Likert-scale format. Item-level and instrument-level content validity were assessed using three cycles of cognitive interviewing with 28 nurses, and eight expert ratings. The OLDI was administered to nurses in Magnet® hospitals via a web-based survey. National Database of Nursing Quality Indicators (NDNQI) and Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) reports were used for comparison of hospital performance. Predictive validity was tested using multiple linear regression. Based on a power analysis for multiple linear regression, reaching 80% power, with a medium effect size of 0.15, an alpha of 0.05, and five predictor variables, the target sample size was 92 hospital units.

Results: Results from 63 inpatient units in 11 Magnet® hospitals were used. The scale-level content validity for this instrument was 0.95 and item-level content validity index scores ranged from 0.86 to 1.0, suggesting excellent content validity. No significant relationships were found between OLDI results and NDNQI measures. Significant correlations ($P<.05$) were found between several OLDI constructs and HCAHPS composites.

Discussion: Correlations with HCAHPS scores help validate the OLDI, as well as the theory underlying the instrument. The OLDI may not have predicted NDNQI measures due to a lack of instrument sensitivity or because NDNQI results are strongly influenced by other factors. Nurse managers can use the OLDI to predict unit performance related to patient satisfaction and to determine actions that may improve unit performance. Replicating this study with a larger sample size and more diverse hospital performance and more uniform unit type could further validate this instrument.

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Healthcare leaders have the opportunity and challenge to improve patient outcomes and patient experience by developing skilled, engaged teams, building their organization's capacity for change and attending to its financial viability. The Institute of Medicine's landmark study (2000) brought to light failures within the healthcare system and triggered a cascade of efforts to improve the quality and safety of hospital-based care. Later, Medicare reimbursement policies began driving the use of unit-reported incidents and mandatory care bundles to improve patient outcomes and satisfaction (Medicare, 2019a).

Despite these improvements, instances of preventable harm continue to plague healthcare (Bates & Singh, 2018). In hospitals, an estimated 400,000 deaths per year are caused by preventable harm (James, 2013) leading to an estimated $1 trillion of additional yearly costs (Slawomirski, Auraaen,& Klazinga, 2017). The complexities and diversities of inpatient care illustrate the importance of developing new approaches to improve patient outcomes.

Organizational learning (Edwards, 2017; Senge, 1990) offers some hope as a means for improving outcomes in hospitals (Institute of Medicine, 2012; Lyman, Ethington, King, Jacobs, & Lundeen, 2017; Lyman, Shaw, & Moore, 2017; Nembhard, Alexander, Hoff, & Ramanujam, 2009). Organizational learning is "a process of positive change in the collective knowledge, cognition, and actions within an organization, which enhances the organization's ability to achieve its desired outcomes" (Lyman, Hammond, & Cox, 2018, p. 11). Through this approach, hospital leaders can help each hospital unit develop its capacity to drive improvement.

Little is known about how organizational learning occurs in the hospital setting, but recent research suggests hospital units develop their capacity for organizational learning

through a series of developmental stages. Lyman et al. (2017a; 2017b) explored the process by which organizational learning occurred in high-performing hospital units and identified four distinct developmental stages associated with organizational learning including:(1) Identity and Ownership, (2) Team and Respect, (3) Accountability and Support, and (4) Reliability and Sustainability (see Table 1). Evaluating developmental progression at the hospital unit level is an important step toward facilitating organizational learning and selecting developmentally appropriate improvement initiatives.

However, there is a need to develop valid instruments for measuring organizational learning in healthcare, intended for measurement at the hospital unit level. Existing instruments designed for measuring organizational learning include the Learning Organization Survey -27 (LOS-27) (Singer, Moore, Meterko, & Williams, 2012) and the Dimensions of a Learning Organization Questionnaire (DLOQ) (Watkins & O'Neil, 2013). Both the LOS-27 and the DLOQ were initially designed for use outside of the healthcare environment and their validity for use in healthcare has not been established. Additionally, both surveys are designed to measure organizational learning at the macrosystem level rather than the microsystem level. In response to this need, results from two qualitative studies (Lyman et al., 2017a; Lyman et al., 2017b) were used to design a research instrument to measure developmental stages associated with organizational learning at the microsystem (unit) level in hospitals.

The primary purpose of this study is to establish the content and predictive validity for the Organizational Learning Development Instrument (OLDI). It is anticipated that, with additional reliability and validity testing, researchers and hospital administrators will be able to use this instrument to accurately assess the developmental state of hospital units to select interventions to foster highly-reliable, excellent clinical performance.

Methods

Instrument Development

       Theoretical foundation. A bottom-up strategy (Kearney, 2016a) was used to generate a starting set of items for this instrument. All items were generated from the results of two qualitative studies (Lyman et al., 2017a; 2017b), in which organizational learning in two hospital units was explored using learning histories. The four developmental stages identified in these studies (Table 1) served as a theoretical foundation for generating survey items pertaining to four distinct constructs resulting in the 35-item OLDI. For each question, participants use a 4-point Likert-type scale ("Strongly Agree" to "Strongly Disagree") to indicate their degree of agreement with each statement. The process used to test the content validity of the instrument is described below.

       Content validity. Item-level and instrument-level content validity was assessed and strengthened using both a bottom-up strategy (Kearney, 2016a) involving cognitive interviewing (Willis, 2004), and a top-down strategy (Kearney, 2016a) using expert review (Lynn, 1986; Polit, Beck, & Owens, 2007).

       Step 1: Cognitive interviews. Cognitive interviewing is a process used to refine items on an instrument, thus improving item-level content validity. For this study, Willis' (2004) cognitive interviewing process was used. The participants were registered nurses from a variety of hospitals (rural, urban, for-profit, not-for-profit, etc.) and inpatient hospital units (medical, surgical, labor & delivery, intensive care, etc.). The first round of individual interviews continued until the researchers found enough information to make meaningful revisions to the survey. Eight nurses participated in the first round of cognitive interviews.

According to Willis' (2004) recommendations, items were then revised based on the information generated during the first round of cognitive interviews. An additional 10 nurses participated in the second round of individual cognitive interviews, after which data was analyzed and the items revised accordingly. After two rounds of cognitive interviews, the instrument was presented to experts for review. Changes made at this point were limited to nursing language nuances to clarify 26 original items.

Step 2: Expert reviews. An expert review process based on Lynn (1986) and Polit, Beck, and Owens (2007), was used to assess and strengthen item-level and survey-level content validity. Eight experts in organizational learning and/or hospital unit leadership used the Content Validity Index (CVI) to rate each survey item's relevance its respective concept. Item-level content validity (I-CVI) was calculated by determining the proportion of experts rating the item as "quite relevant" or "very relevant". The I-CVIs were also averaged to calculate a Scale CVI (S-CVI). A scale with "excellent" content validity is comprised of items with an I-CVI of 0.78 or greater (Lynn, 1986; Polit, Beck, & Owens, 2007) and has an S-CVI of 0.9 or higher.

The experts were also asked to suggest revisions and new survey items to more completely address the concept being measured. Minor revisions were suggested for some items. The suggested revisions were made. Additionally, some experts identified important concepts that were not specifically addressed by the initial items. For example, "On my unit, team members are proud of a collective unit identity" was expanded to include the following items: "On my unit, team members have shared values that guide their work", "On my unit, team members are proud of the work the team does", and "On my unit, team members are proud of the unit's reputation". This process resulted in nine new items. By following this recommendation, the instrument expanded from 26 items to 35 items. A third round of cognitive interviews was then initiated.

Step 3: Cognitive interviews. A third round of cognitive interviews was conducted to confirm clarity with changes post expert opinion. There were no substantial item changes necessary secondary to this round of interviews. Due to the high I-CVI and S-CVI results from the first round of expert reviews (see Results), a second round was deemed unnecessary to meet the standards for excellent content validity.

Setting and Sample

Inpatient hospital units were the units of analysis for this study, with a focus on hospital units situated within Magnet® hospitals. Magnet® hospitals were selected for data quality purposes and to leverage their research infrastructure. Data quality was expected to be high in Magnet® hospitals because 98% of Magnet® hospitals participate in the National Database of Nursing Quality Indicators (NDNQI) Program (Press Ganey, n.d.). Participating in the NDNQI program involves collecting and regularly reporting unit-level patient outcomes data. Each measure has a precise definition, a standard unit of measurement, and a consistent reporting format for all participating hospitals. Second, Magnet® Hospitals are required to participate in research studies to maintain their Magnet® status, thus ensuring each participating hospital had the infrastructure necessary to support this research project (Johantgen et al., 2017).

The Hospital Consumer Assessment of Healthcare Providers and Systems (HCAHPS) scores mandate each hospital provide standardized patient satisfaction ratings to show how the patients perceive the unit's performance (Centers for Medicare and Medicaid Services, 2017). These data were collected to provide objective data for comparison against nurse perception of unit performance.

Hospital unit data were gathered from two sources: 1) unit-level characteristics and outcomes data through hospital-generated reports; 2) information about the hospital units'

developmental progression related to organizational learning via a web-based survey administered

to nurses who provide direct patient care on participating units. The target sample size was 92

hospital units, with responses from 60% of the nurses on each unit. According to Mass and Hox

(2005), a unit must have a minimum of five responses to provide adequate data for analysis.

Data Collection

      Web-based survey. Each participating hospital designated an individual to introduce and

distribute the web-based survey to staff, send reminder emails, and encourage participation.

Individual participants received an email containing a link to the web-based OLDI. Participants

were directed to a consent screen followed by the 35-item instrument. Participants used a 4-point

Likert-type scale to indicate their degree of agreement with each statement (from "Strongly

Agree" to "Strongly Disagree"). Nurses took between three and eight minutes to complete the

survey. Participants who did not respond to the initial link received two additional reminder

emails with a link to the questionnaire. Although there were no direct benefits to the participants,

each participant had the option to enter a drawing for a chance to win a $50 Amazon.com gift

card (six gift cards were awarded in each participating hospital).

      Unit-level data. Participating hospitals shared unit-level outcomes including: patient falls,

hospital-acquired pressure injuries (HAPI), central line-associated bloodstream infections

(CLABSI), catheter-associated urinary tract infection (CAUTI), and ventilator-associated

pneumonia (VAP). For each of these measures, NDNQI definitions and reporting schedule were

used. Additionally, units shared HCAHPS scores as they were reported to CMS using the

mandatory standardized questions. For the HCAHPS scores, most hospitals only reported their

"top box" scores, meaning the percentage of responses in the highest possible category for a

question. For example, hospitals only reported the percent of respondents who answered

"Always" to the question, "During this hospital stay, how often did nurses listen carefully to you?"

Ethical considerations. Institutional Review Board (IRB) approval through Brigham Young University and all necessary site-specific approvals were obtained.

Data Analysis

The analysis included performing multiple regression to establish predictive validity of the OLDI. Separate analyses were performed to test the validity of each subscale and the overall instrument (see Table 1) while controlling for unit type. Outcomes were the NDNQI measures of CLABSI, VAP, falls, HA-pressure ulcers, and CAUTI as well as the HCAHPS measures which were grouped into questions relating to certain categories (see Table 2). An example of one analysis was: after controlling for unit type, how does the organizational learning stage of Identity and Ownership predict CLABSI? Using GPower (Version 3.1.9.2) estimates for multiple regression, based on a medium effect size of 0.15, an alpha of 0.05, and five predictors (organizational learning stages or aggregate score and unit) a sample size of 92 hospital units were needed to reach an 80% power to determine the predictive power of the OLDI and its subscales.

Results

Survey responses were received from 1194 nurses from 92 inpatient units in 11 Magnet® hospitals. At least five responses were received from 63 of these units, making them adequate for analysis. Unit types included: 31 adult non-intensive units (medical, surgical, orthopedic), 10 adult intensive care units, 13 pediatric non-intensive (medical, surgical, oncology), 5 pediatric intensive care units (NICU and PICU), and 4 women's units (labor and delivery and mother/baby).

Item and Scale Content Validity

After a round of expert reviews, the S-CVI was 0.95 and I-CVIs for each item ranged from 0.86 to 1.0, suggesting excellent content validity for the items individually and the instrument overall. Comments from experts were reviewed and I-CVI scores were considered to determine no further changes to the items were needed.

Predictive Validity

Predictive validity is a type of criterion-related validity which indicates the extent to which performance on the criterion can be predicted based from the performance on a prior measure (Waltz, Strickland, & Lenz, 1984). For this study then, the predictive validity estimated the ability of the OLDI to predict indicators of unit performance, such as NDNQI measures and HCAHPS composites.

Measures of centrality. Means and standard deviations were calculated for the each OLDI subscales (see Table 3). On the 4-point scale, means ranged from 3.11 to 3.21 and standard deviations ranged from 0.27-0.30.

Skewness. Skewness for each variable was calculated to determine whether the OLDI subscales, NDNQI measures, and HCAHPS subscales met normality assumptions. All met normality assumptions, except three OLDI subscales (Team and Respect, Accountability and Support, and Reliability and Sustainability), OLDI Total, the NDNQI CAUTI measure, and the HCAHPS Cleanliness composite. As the Magnet® Hospitals are expected to have high-performing units, it is reasonable to assume the distribution of the OLDI total scores and its subscales would be skewed positively. CAUTI measures may be skewed positively due to the success many hospitals have experienced with adopting evidence-based CAUTI prevention bundles. It is unclear why patient ratings of cleanliness were skewed.

NDNQI. All NDNQI measures were normalized to calculate the frequency of each event occurring per 1000 patient days. After controlling for unit type, none of the OLDI subscales or the OLDI aggregate score were significantly related to any of the NDNQI measures. Subsequent analysis revealed unit type was strongly related to each of the NDNQI measures, possibly overshadowing the effect of the OLDI subscales and aggregate.

HCAHPS. HCAHPS scores were calculated as the proportion of survey respondents giving the unit the highest possible rating (i.e. "Always", "Definitely" or 9-10/10). After controlling for unit type, the Identity and Ownership Subscale was predictive of three HCAHPS composites, Team and Respect was not predictive of any HCAHPS composites, Accountability and Support were predictive of three HCAHPS composites, and Reliability and Sustainability were predictive of six HCAHPS composites. Additionally, the scale as a whole was predictive of two HCAHPS composites (see Table 3).

Discussion

Two recent learning histories (Lyman et al., 2017a; Lyman, Shaw, & Moore, 2017b) suggest hospital units progress through sequential developmental stages to become learning organizations. First, these hospital units began to develop a clear unit identity and a sense of ownership related to that identity. Second, the units adopted a more team-oriented approach to care and respectful behaviors within the team. Third, the units instituted individual and collective accountability standards, as well as mechanisms of support to facilitate achieving the standards. Finally, the units implemented systems-based processes to achieve and sustain their desired level of performance. The present study involved developing and testing a survey instrument designed to measure those developmental stages and establish the instrument's content and predictive validity.

Content validity. The instrument's content validity was supported by cognitive interviews. Cognitive interviews improved the instrument's clarity, and thus content validity. When items are clearly written, content validity is stronger because participants are more likely to interpret the items as the researcher intends. As a result, variations in participant responses are more likely to reflect actual differences experienced by the participants (rather than alternative interpretations of the question). By the third round of cognitive interviews, the researchers found no new evidence that participants were interpreting the items differently than the researchers intended. (Kearney, 2016a; Willis, 2004)

Predictive validity. The results of the cognitive interviews and expert reviews gave us confidence that the OLDI has some degree of predictive validity (Kearney, 2016a). Predictive validity was tested by using multiple regression to determine whether the constructs measured by the OLDI were predictive of accepted indicators of hospital unit performance. Correlations between the OLDI and unit performance help validate the OLDI, as well as the theory underlying the instrument.

There are two primary explanations for why the OLDI may not have been significantly predictive of NDNQI measures. First, the items used to measure the OLDI constructs of Identity and Ownership, Team and Respect, and Accountability and Support may not be sensitive enough to measure significant differences in the constructs of interests, particularly in Magnet® hospitals where these constructs may be universally abundant. This explanation is supported by the relatively high mean, small standard deviation, and high degree of skewness seen for each of the OLDI measures. Repeating this study with a larger sample size and a sample with a more diverse range of OLDI scores could offer important insights into the OLDI's predictive validity.

Another explanation for OLDI's inability to predict the NDNQI is that differences among the units were too small to detect and/or were so strongly influenced by other factors (i.e. unit type) that the OLDI measures were not able to predict any additional significant difference. This explanation is supported by the extremely high predictive capability of unit type on most NDNQI measures (e.g. pediatric units strongly predict Discharge Teaching and Quietness scores and Women's units score strongly predict HCAHP Total scores). Because unit type explained so much of the performance variation related to NDNQI performance, it was difficult for OLDI scores to predict any additional variation. Replicating this study with a larger sample size and a more uniform sample (in terms of unit type) could also offer important insights into the OLDI's predictive validity.

Lyman et al. (2017a, 2017b) suggest learning organizations achieve reliable, sustainable performance when the organization has progressed through four developmental stages. Our data offer some support to this theory. Three of the OLDI subscales and the OLDI total score were predictive of important measures of patient satisfaction, suggesting each is important. The second scale, while not showing significant correlation in this study, has been shown to be an important step in the developmental process in the previously mentioned studies and should continue to be measured. It is intriguing that the OLDI Reliability and Sustainability Subscale data was the most predictive of patient satisfaction outcomes. This finding may suggest that, while all of the developmental stages are important, significant changes in measurable performance may become more prevalent as the organization adopts processes that help them sustain best practices.

Limitations. This study has several limitations. First, the study was underpowered. Our sample size of 63 units fell below the target of 92. Thus, some significant findings may have been missed. Based on initial parameters, power reached a maximum of 60%.

The sample only included Magnet® hospitals. While this likely offered benefits by means of reaching hospitals that were better prepared to engage in the study, it also likely decreased variability in performance across hospitals, thus making it harder to find statistical significance and maintain appropriate normality assumptions. Although it may be difficult for the newly developed instrument to identify differences among organizations that are heavily invested in organizational learning, the importance of high-quality data and existing research infrastructure in the hospitals justify the decision to focus this study on Magnet® hospitals.

Our sample only included nurses and no other professionals who may have been familiar with the unit. While nurses do make up the majority of the staff on a given hospital unit, we recognize that different perspectives were missed that could potentially change results. This lack of insight may be reflected in the lack of significant findings correlating certain measures to the OLDI (i.e. Doctor Communication).

To date, we have not conducted reliability testing with the data, thus we do not know if there are items currently included in the scale that should be discarded. This is outside the scope of this thesis and will be conducted prior to full publication. Running similar analyses as are reported here, except with the unreliable items discarded, might improve the scales' predictive validity.

Many of the participating hospitals only shared the proportion of patients who gave the highest possible rating on the HCAHPS measures ("top box" scores). This results in lost variability in the sample and requires the OLDI to be even more sensitive to predict changes in the HCAHPS scores. Additionally, some hospitals reported fewer than four quarters of data, which might decrease the accuracy of the overall unit performance. Due to the lack of data and

the smaller sample size than what was desired, we were not able to control for as many variables as we had hoped to control.

Eighty analyses were performed for this study, therefore the chance of finding statistical significance was artificially inflated. As a result, it is possible that some of our findings were due to chance rather than actual relationships among the variables.

Implications. Although additional reliability and validity testing are necessary before the OLDI can be used with confidence, the OLDI's predictive capabilities may have utility for both clinical leaders and researchers. As such, additional validity and reliability testing may shorten the OLDI's length. Based on our findings, the OLDI can currently be used by unit managers to predict unit performance related to patient satisfaction. More significantly, nurse managers can use the OLDI to determine actions that may improve the unit's performance. For example, a manager whose hospital unit has difficulty managing patients' pain, could administer the OLDI to the staff to determine if there are instrument items on the Identity and Ownership or Sustainability and Reliability Subscales that are scored low. After developing an intervention to improve the low score, the manager could monitor subsequent OLDI scores and patient satisfaction data to determine if the intervention was effective.

Additional reliability and validity testing are necessary before using the OLDI for research purposes. When the OLDI has established reliability and validity, a researcher could, for example, use the OLDI to study specific unit-level contextual factors thought to promote development related to organizational learning.

Future research. Future research should focus on exploring the relationship between the OLDI subscales and hospital unit performance. Specifically, researchers should replicate this study with a sample known to have more diversity in performance to see if the tool can predict

differences. In other words, non-Magnet® hospitals and low-achieving units should be used for comparison. This would help normality in the scale results. Variables could further be controlled by limiting the sample to a narrower range of unit types (e.g. either adult ICUs or adult non-intensive care) to eliminate variation related to unit-type in the NDNQI data.

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Appendix A

Table 1

Developmental Stages Associated with Organizational Learning and OLDI Items

Developmental Stage	Description
1. Identity and Ownership	Team members have a collective identity they are proud of. The identity may be comprised of shared experiences, a common purpose, and/or pride in their performance. Team members take ownership for advancing and sustaining the identity. Items 1. On my unit, team members are proud of a collective unit identity. 2. On my unit, team members have shared values that guide their work. 3. On my unit, team members are proud of the work the team does. 4. On my unit, team members are proud of the unit's reputation. 5. On my unit, team members have a shared vision for the unit. 6. On my unit, team members feel united 7. On my unit, team members share a common purpose. 8. On my unit, team members take personal responsibility to advance a positive unit identity. 9. On my unit, team members take personal responsibility to improve the unit's performance. 10. On my unit, team members take personal responsibility to promote positive team values. 11. On my unit, team members take personal responsibility to strengthen the unit's reputation 12. On my unit, team members take personal responsibility to achieve the unit's purpose. 13. On my unit, team members take personal responsibility to achieve the unit's vision.
2. Team and Respect	Team members work together toward a common purpose, sometimes prioritizing the team's needs above their own. They show respect to each other through language and actions. Items: 14. On my unit, team members work well together. 15. On my unit, team members work together toward a common purpose. 16. On my unit, team members prioritize the team's needs above their own, when necessary. 17. On my unit, team members communicate respectfully with one another. 18. On my unit, team members act respectfully toward one another. 19. On my unit, members of the interdisciplinary team (e.g. nurses, aids, managers, physicians, therapists, pharmacists, etc.) work respectfully with one another.

| 3. | Accountability and Support | Clear standards of accountability exist within the organization. Team members also hold themselves and each other accountable to high standards of performance. Each team member is supported toward meeting performance standards by both the organization and fellow team members. |

Items:
20. On my unit, there are clear standards for personal accountability.
21. On my unit, there are clear standards for professional accountability.
22. On my unit, team members' performance is evaluated according to clear standards.
23. On my unit, individual team members hold themselves accountable to high standards of performance.
24. On my unit, team members hold each other accountable to high standards of performance.
25. On my unit, the unit as a whole is held to a high standard of performance (e.g. a benchmark for reducing patient falls).
26. On my unit, team members help one another meet performance standards.
27. On my unit, new team members receive an effective orientation to help them meet performance standards.
28. On my unit, team members receive effective ongoing training to help them meet performance standards.
29. On my unit, team members receive effective ongoing mentoring or coaching to help them meet performance standards.

| 4. | Reliability and Sustainability | Team members collaborate to build systems that make excellent performance more reliable and sustainable. |

Items:
30. On my unit, team members follow evidence-based practices to ensure that patients consistently receive quality care.
31. On my unit, team members use technology to ensure that patients receive quality care (e.g. using bar code scanning to reduce medication errors).
32. On my unit, team members evaluate adverse events that occur (e.g. huddling after a patient fall or Code Blue) to improve future performance.
33. On my unit, team members evaluate trends in the unit's performance (e.g. an increase in infection rates) to improve future performance.
34. On my unit, team members help create unit-level policies, protocols, or processes to sustain improved performance.
35. On my unit, necessary adjustments are made to ensure changes on the unit do not compromise excellent patient care (e.g. ensuring all staff are adequately trained when adopting new equipment).

Note: Descriptions based on information from Lyman, B., Ethington, K. M., King, C., Jacobs, J. D., & Lundeen, H. (2017).

Table 2

HCAHPS Composite Guide

Composite Title	HCAHPS Question Numbers	Child HCAHPS Question Numbers
Nurse Communication	1, 2, 3	8, 9, 10, 14, 15, 16
Doctor Communication	5, 6, 7	11, 12, 13, 17, 18, 19
Responsiveness of Hospital staff	4, 11	27
Pain Management	13, 14	32
Communication About Medicines	16, 17	39, 40
Discharge Information	19, 20	36, 37, 43
Cleanliness of Hospital Environment	8	33
Quietness of Hospital Environment	9	34
Overall Rating of Hospital	21	48
Willingness to Recommend Hospital	22	49

Note: Based on information from Medicare. (2019b).

Table 3

Mean and Standard Deviation OLDI

OLDI Subscale	Mean (SD)	Number of Units with Adequate Responses (n)
Identity and Ownership	3.18 (0.30)	n=63
Team and Respect	3.21 (0.30)	n=63
Accountability and Support	3.11 (0.30)	n=63
Sustainability and Reliability	3.19 (0.27)	n=63
Total OLDI Score	12.68 (1.10)	n=63

Table 4

Significance of Comparison OLDI Subscales vs. HCAHPS Scores

HCAHPS Composite	Mean (SD)	Significance: Identity & Ownership	Significance: Team & Respect	Significance: Accountability & Support	Significance: Reliability & Sustainability	Significance: OLDI Total
1. Nurse Communication (n=53)	81.2 (7.2)	0.037*	0.092	0.134	0.218	0.101
2. Doctor Communication (n=38)	75.1 (11.3)	0.461	0.456	0.489	0.550	0.482
3. Responsiveness of Hospital Staff (n=52)	70.1 (12.6)	0.776	0.661	0.878	0.938	0.838
4. Pain Management (n=53)	67.9 (11)	0.034*	0.067	0.078	0.032*	0.043*
5. Communication about Medicines (n=46)	68.7 (10.6)	0.280	0.3	0.239	0.039*	0.2
6. Discharge Information (n=43)	76.3 (10.6)	0.002**	0.005**	0.004**	0.000*	0.002**
7. Cleanliness of Hospital Environment (n=38)	74.6 (15.5)	0.084	0.071	0.021*	0.011*	0.033*
8. Quietness of Hospital Environment (n=38)	59.5 (21.4)	0.046**	0.062	0.022*	0.006*	0.027**
9. Overall Rating of the Hospital (n=39)	76.4 (10.5)	0.052	0.089	0.101	0.105	0.087
10. Willingness to Recommend Hospital (n=27)	88.4 (6.6)	0.364	0.445	0.462	0.380	0.480
HCAHPS Total Score (n=53)	73.8 (8.4)	0.009*	0.042**	0.033*	0.010*	0.015*

*$p=<0.05$
**=value significance unreliable due to strong unit correlations