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Associations of pediatric nurse burnout with involvement in quality improvement

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ABSTRACT

Purpose: Burnout among nurses negatively impacts patient care experiences and safety. Inpatient pediatric nurses are high-risk for burnout due to high patient volumes, inadequate staffing, and needing to balance the demands of patients, families and team members.
We examined the associations of inpatient pediatric nurse burnout with their perspectives on the importance of quality at the hospital, patient experience measurement, quality improvement (QI), unit culture, and staffing.
Methods: We conducted a cross-sectional study at an urban children's hospital. We surveyed pediatric nurses about their perspectives including the single-item Maslach Burnout Inventory. We fit separate regression models, controlling for role, location and unit, predicting outcome measures from the dichotomized burnout scale.
Results: Twenty-seven percent of pediatric nurses reported burnout. Nurses who had more confidence in patient experience measurement, received frequent patient experience performance reports, felt included in QI, and experienced QI efforts as integrated into patient care reported not being burned out (compared to those reporting burnout; all p-values<0.05). More open communication among nurses (e.g., about possible problems with care) and unit-level teamwork were also associated with not being burned out, whereas a larger QI workload was associated with burnout (p-values<0.05).
Conclusions: Open communication among nurses and nurses being more involved and valued in QI efforts were related to not being burned out. Research is needed to further examine aspects of QI involvement that reduce burnout.
Practice implications: Supporting open communication among pediatric nurses, engaging them in QI and integrating QI into patient care while minimizing QI workload may decrease burnout.

Background

Nurse burnout–characterized by emotional exhaustion, depersonalization, and decreased personal accomplishments (National Academies of Sciences, Engineering, and Medicine, 2019) is increasing (Holdren et al., 2015; Oehler & Davidson, 1992; Shah et al., 2021) and particularly salient given the stressors associated with COVID-19 (Billings et al., 2021; Dillon et al., 2022; Wan, 2021). Nurse burnout is significantly associated with job dissatisfaction, less organizational commitment, and intention to quit (Guerrettaz, 2012; McHugh et al., 2011; Shah et al., 2021). Existing shortages are exacerbated by nurses leaving the profession in record numbers (Shah et al., 2021; Zhang et al., 2018), with many citing burnout as the driver of the decision (Aiken et al., 2002; Shah et al., 2021). Burnout is associated with patient safety concerns, as nurses experiencing burnout are more likely to make mistakes in clinical care and impact patient safety (Garcia et al., 2019; Halbesleben et al., 2008; Hall et al., 2016; Jun et al., 2021).

Working in a pediatric setting has been identified as a particular risk factor for burnout (Downey et al., 1995; Forsyth et al., 2022; Hecktman, 2012; Pradas-Hernandez et al., 2018; Robins et al., 2009). Frontline pediatric nursing staff report increased burnout stemming from high patient volumes, inadequate staffing, high levels of stress, and feeling

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trapped between the demands of patients and families and those of care team members (Bodenheimer & Sinsky, 2014). More years in direct care as a nurse and greater nurse empathy, in particular the emotional blurring of boundaries between nurse and patient (i.e., nurses taking on the role of a patient caregiver), were predictive of greater burnout (Robins et al., 2009; Sabo, 2006). As a result, many studies have called for further examination of the risk factors for burnout in pediatric nurses (Downey et al., 1995; Hecktman, 2012; Pradas-Hernandez et al., 2018; Robins et al., 2009).

Although the primary role of nurses is to deliver patient care, another key role is to lead and participate in quality improvement (Draper et al., 2008). These activities are in addition to their patient care responsibilities, with nurses identifying, assessing and driving changes in the many processes and workflows that are often not under the direct purview of the physician in the care team. Nursing involvement is key to quality improvement, as good communication by nurses is associated with patient engagement in care and overall improvements in patient experience (Bowles et al., 2001; Hibbard et al., 2006; McGilton et al., 2006). Reviews of the ways in which patient engagement can impact care delivery (Bombard et al., 2018; Evans, 2016) highlight that improved nurse communication leads to improvements in care delivery and patient experience (Baldwin & Spears, 2019; Coulter, 2012; Radtke, 2013; Vines et al., 2014). Hospitals that provide support for nurses (e.g., teamwork, adequate staffing ratios, and time for organizational learning and professional practice) improve patient experiences and scores (Abrahamson et al., 2016; Kelly et al., 2021; Parker & Kulik, 1995; Pearson et al., 2016; Shah et al., 2021; Spence Laschinger & Leiter, 2006; Van Bogaert et al., 2010).

Despite the well-established relationship between adequate and consistent hospital staffing, support and dedicated work time for nurses to learn from their experiences with reduction in nurse burnout, there is little evidence about how quality improvement activities aimed at improving care relate to nurse burnout, and whether quality improvement activities contribute to or mitigate burnout. If quality improvement activities enable nurses to improve the care they provide and allow their voices to be heard, then it could minimize nurse burnout. However, if quality improvement is seen as an added burden on top of delivering direct care to patients, then quality improvement efforts could increase burnout. To address this gap in the literature, we examine the perspectives of inpatient pediatric nursing staff about the importance of quality, engagement in patient experience measurement, QI (attitudes, inclusion, workload), unit culture, and staffing by nurse burnout status. We hypothesize the following about burnout among inpatient pediatric nurses:

- Ho1: Nurse perceptions about the "importance of quality" at the hospital will be associated with less nurse burnout. Specifically, importance of quality will be measured by 4 items –*Perception of hospital priorities* (M1), *Importance of organizational culture surrounding quality (M2)*, *Importance of patient experience relative to other goals* (M3) and *Patient experience measures being included in reports* (M4) – and we hypothesize that each will be associated with less nurse burnout.
- Ho2: Higher "engagement in the measurement of patient experience" will be associated with less nurse burnout: Specifically, engagement in the measurement of patient experience will be measured by 5 items – *Agreement on validity of Child HCAHPS patient experience scores* (M5), *Agreement on approaches that improve Child HCAHPS scores* (M6), *Having measurable patient experience performance targets* (M7) alongside receiving frequent information about such patient experience data [(i.e., *Receiving reports on patient experience scores quarterly or more often* (M8) and *include narrative data from patient comments* (M9)] – and we hypothesize each are associated with less nurse burnout.
- Ho3: Positive "attitudes toward QI" will be associated with less nurse burnout. Specifically, attitudes toward QI will be measured by 3 items – *Attitude about QI being essential* (M10), *QI efforts are integrated into patient care* (M11) and *QI efforts are (not) a burden which negatively affects workload* (M12)—and we hypothesize each are associated with less nurse burnout.
- Ho4: "Inclusion in QI" will be associated with less burnout. Specifically, inclusion in QI will be measured by 3 items – *Inclusion in QI* (M13), *Communication openness* (M14) across nursing staff (supervisors and frontline staff) and *Empowerment* (M15) – and we hypothesize each will be associated with less burnout.
- Ho5: Having a larger "QI workload" will increase burnout. Specifically, having a larger QI workload is measured by the sum of the number of reported *Child HCAHPS domains that the hospital worked to improve in the last 12 months* (M16) and we hypothesize is associated with burnout.
- Ho6: Positive "unit culture" will reduce burnout. Specifically, unit culture will be measured by 3 items – agreement that *Unit functions very well together as a team* (M17), *Staff committed to quality work* (M18) and *Communication across transitions* (M20) and we hypothesize that each are associated with less nurse burnout.
- Ho7: Adequate staffing will reduce burnout. Adequate staffing is measured by *Have enough staff to handle the workload* (M19) and will be associated with less nurse burnout.

Methods

We partnered with an urban, 131-bed children's hospital with two facilities nested within an academic medical center on the West Coast. Both facilities have pediatric and neonatal intensive care units (PICU and NICU, respectively); one facility also has pediatric intensive care and pediatric cardiac ICU units. In July 2017, the hospital began using the Child Hospital Consumer Assessment of Health Care Providers and Systems (HCAHPS) (Toomey et al., 2015; Toomey et al., 2017) survey to collect patient experience data from families of hospitalized children.

Data collection

We developed a survey that asked frontline/bedside nursing staff about patient experience measurement and using the Child HCAHPS data; it included measures about nurse perception of hospital leadership's importance placed on quality of care, patient experience measurement, quality improvement (e.g., attitudes, inclusion, workload), unit culture (e.g., teamwork, communication) and staffing replicating items from seven relevant surveys (Bradley, 2012; Dunagan, 2017; Harter et al., 2013; Maguire et al., 2013; Read, 2016; Shoemaker et al., 2016; Sorra & Dyer, 2010; Thorp et al., 2012) and including a few newly-developed measures. Survey development, including descriptions and citations for the relevant surveys/measures, and administration details are described elsewhere (Quigley et al., 2021).

The survey included 20 measures – 11 composites measures: *Perceptions of hospital priorities* (Measure (M)1, 3 items), *Importance of organizational culture surrounding quality* (M2, 6 items), *Importance of patient experience relative to other goals* (M3, 3 items), *Patient experience measures being included in reports* (M4, 3 items), *Agreement on validity of Child HCAHPS scores* (M5, 7 items), *Agreement on approaches that can improve HCAHPS scores* (M6, 12 items), *Attitude about quality improvement being essential* (M10, 2 items), *Inclusion in quality improvement* (M13, 2 items), *Communication openness* (M14, 3 items), *Child HCAHPS domains that the hospital worked to improve in the last year* (M16, 19 items), *Communication across transitions* (M20, 2 items), and 9 single-item measures: two assessing frequency of reporting of patient experience measures [(i.e., *Receiving reports on patient experience scores quarterly or more often* (M8) and *include narrative data from patient comments* (M9)], and one each assessing *Having measurable patient experience performance targets* (M7), *QI efforts are integrated into patient care* (M11), *QI efforts are (not) a burden which negatively affects workload* (M12),

Empowerment (M15), *Unit functions very well together as a team* (i.e. unit-level teamwork, M17), *Staff committed to quality work* (M18) and *Have enough staff to handle the workload (*i.e. *adequate staffing)* (M19). Response options are summarized in Table 2. It also included a five-item social desirability scale (Hays et al., 1989).

We included the single-item version of the Maslach Burnout Inventory developed by West et al. which identifies burnout among physicians including those in residency (Rohland et al., 2004; West et al., 2009; West et al., 2012). The single Maslach Burnout Inventory item uses a five-category response scale: 1 = "I enjoy my work. I have no symptoms of burnout."; 2 = "Occasionally I am under stress, and I don't always have as much energy as I once did, but I don't feel burned out."; 3 = "I am definitely burning out and have one or more symptoms of burnout, such as physical and emotional exhaustion."; 4 = "The symptoms of burnout that I'm experiencing won't go away. I think about frustrations at work a lot."; and 5 = "I feel completely burned out and often wonder if I can go on. I am at the point where I may need some changes or may need to seek some sort of help."

We administered the survey at recurring staff meetings (with non-physician staff only; documenting who took the survey to ensure that a survey was only answered once) at both facilities October 2019 through January 2020 (18 total meetings). Staff were given paper surveys on arrival and returned them to study staff. The completed surveys were anonymous, and no honorarium was provided. Eligibility was based on being a pediatric non-physician nursing staff member on any of the pediatric units including the pediatric and neonatal intensive care units (PICU and NICU, respectively), and pediatric cardiac ICU units.

Data analysis

Burnout, as measured by the single Maslach Burnout Inventory item using a five-category response scale, is defined by a respondent having a score of 3 or higher, resulting in a dichotomized (0/1) burnout scale.

We compared frontline staff by their response to the burnout item. We compared these groups by role (Registered Nurse vs. licensed practical or licensed vocational nurses), location, unit (neonatal intensive care vs. pediatric unit), and by social desirability. Pearson's Chi-squared tests were used to compare groups by role and unit, Fisher's exact test was used to compare groups by location, and a *t*-test was used to compare social desirability between the two groups.

We had 7 hypotheses including 20 measures (as described in detail above). To test these hypotheses, we fit separate regression models predicting the outcome measures from the dichotomized single-item burnout scale as our main independent variable. Outcomes were treated as continuous measures, except for single items with Yes/No response options, where logistic regression models were fit. All models controlled for role, location, unit, and the social desirability scale. For the main effect in each model, we used an alpha of 0.05 to denote the significance level (i.e., p-value <0.05 the decision rule is to reject the null hypothesis), and due to the study's exploratory nature, we did not adjust for multiple testing.

For the domains that significantly predicted burnout, we also ran models for each of the survey items within the domains. From these models, we calculated adjusted least square means and Cohen's d for effect size. We used the following rule of thumb when interpreting Cohen's d: values 0.2, 0.50, and 0.80 indicate small, medium, and large effect sizes respectively.(Cohen, 1988).

All analyses were conducted using R version 3.6.1 including *stat* and *emmeans* packages. Study protocols were approved by RAND's Human Subjects Protection Committee.

Results

Almost all (94/97) participants responded to the single-item Maslach Burnout Inventory. Four respondents had non-nursing roles (i.e., Occupational therapist, Child Life Specialist, CNS, NP) and were removed, leaving 90 frontline hospital nursing staff for analysis. Twenty-eight percent (25/90) reported burnout. We found no significant differences between respondents with burnout compared with those not experiencing burnout across role (Registered Nurse vs. licensed practical or licensed vocational nurses), location, unit, and social desirability (Table 1).

Four domains and four single-item measures differed significantly by burnout (Table 2); we report both the domain scores and the items within the domain for only the measures that had significant differences across burnout status, otherwise we report the measure score. Those reporting burnout had lower *Agreement on validity of Child HCAHPS scores* (M5: mean $\Delta = -0.57$, SE = 0.24, p-value = 0.023, Cohen's d = 0.56) and those *Receiving internally generated reports containing information on patient experiences of pediatric and/or NICU inpatient care (*i.e., *closed-ended survey measures/scores) quarterly or more often* was less frequent among those reporting burnout (M8: mean Δ in proportion reporting yes = −0.19, SE = 0.57, p-value = 0.033, Cohen's d = 0.40). Significant differences were not found by burnout for agreement on *Having measurable patient experience performance targets* (M7), *Frequency of receiving internally generated reports on Child HCAHPS narrative data from patient comments (M9)*, or *Agreement on approaches that can improve Child HCAHPS patient experience scores (M6)*. Several domains about overall quality–*Perception of hospital priorities* (M1), *Importance of organizational culture surrounding quality* (M2), *Importance of patient experience relative to other goals* (M3), and *Patient experience measures included in reports received* (M4)–were not statistically significantly associated with burnout.

In terms of more positive nurse attitudes toward quality improvement being associated with less burnout, we found those reporting burnout agreed less about whether *Quality improvement efforts are integrated into patient care* (M11: mean $\Delta = -0.58$, SE = 0.19, p-value = 0.0028, Cohen's d = 0.70) and agreed more about *Quality improvement efforts are a burden that negatively affect my workload* (M12, reverse scored: mean $\Delta = -0.95$, SE = 0.21, p-value ≤0.001, Cohen's d = 0.98). Twelve percent of nurses did not agree that quality improvement efforts were integrated into patient care, whereas 26% of nurses agreed that quality improvement efforts were a burden that negatively affect their workload. We found no significant differences for *Quality improvement being essential* (M10, i.e., believing that continuous quality improvement is an essential part of the daily work of the bedside nurse).

In terms of nurses indicating that the hospital had worked to improve aspects of patient experience (i.e., *Child HCAHPS domains that the hospital worked to improve in the last 12 months,* M16), we found those reporting burnout indicated *more* Child HCAHPS domains that the hospital worked to improve (M16: average proportion of domains endorsed was 0.42 for Burnout vs 0.18 for No burnout, mean $\Delta = 0.24$, SE = 0.071, p-value ≤ 0.001, Cohen's d = 0.79).

In terms of nurses feeling more valued in the process of making improvements, we found those reporting burnout had lower agreement with domains of *Inclusion in quality improvement* (M13: mean $\Delta = -0.45$, SE = 0.16, p-value = 0.0075, Cohen's d = 0.60) and *Communication openness* (M14: mean $\Delta = -0.59$, SE = 0.22, p-value = 0.0086, Cohen's d = 0.62).

Lastly, we found nurses who reported burnout had significantly lower agreement with *Unit functions very well together as a team* i.e., unit-level teamwork (M17: mean $\Delta = -1.09$, SE = 0.23, p-value ≤ 0.001, Cohen's d = 0.91). There were no other significant differences with nurse burnout and other aspects of unit culture (i.e., *Staff committed to quality work* (M18) and *Communication across transitions* (M20)) or with adequate staffing (i.e., *Have enough staff to handle the workload,* M19).

Discussion

We identified a relationship between *lower* levels of burnout and quality improvement activities aimed at improving patient and family

Table 1
Children's Hospital Nursing Staff Characteristics, Overall & By Burnout Status.

Categorical Measures	Burned out+ % (N)	Not Burned out % (N)	Overall % (N)	P-value
Role				0.189
Registered Nurse (RN)	88% (22)	75% (49)	79% (71)	
Licensed Practical or Vocational Nurse (LVN)	12% (3)	25% (16)	21% (19)	
Location				0.137
Location 1	92% (23)	77% (50)	81% (73)	
Location 2	8% (2)	23% (15)	19% (17)	
Unit				0.723
Neonatal Intensive Care Unit (NICU)	24% (6)	28% (18)	27% (24)	
Pediatric Units (PU)*	76% (19)	72% (47)	73% (66)	
Total	**28% (25)**	**72% (65)**	**100% (90)**	
Continuous Measure	**Mean (SD)**	**Mean (SD)**	**Overall Mean (SD)**	
Social Desirability	64.8 (29.0)	67.7 (25.4)	66.9 (26.3)	0.664

Note: * Includes Pediatric Intensive Care Unit. + Burned out versus Not Burned out is measured by the single Maslach Burnout Inventory item, which uses a five-category response scale: 1 = "I enjoy my work. I have no symptoms of burnout."; 2 = "Occasionally I am under stress, and I don't always have as much energy as I once did, but I don't feel burned out."; 3 = "I am definitely burning out and have one or more symptoms of burnout, such as physical and emotional exhaustion."; 4 = "The symptoms of burnout that I'm experiencing won't go away. I think about frustrations at work a lot."; and 5 = "I feel completely burned out and often wonder if I can go on. I am at the point where I may need some changes or may need to seek some sort of help."; "Burned out" is defined by a respondent having a score of 3 or higher, resulting in a dichotomized (0/1) burnout scale of Burned out and Not Burned out. Social desirability is measured by the 5-item social desirability scale (Hays et al., 1989).

care experiences being *more* integrated into patient care, nurses being *more* involved in quality improvement, feeling *more* valued in the quality improvement process of making improvements, reporting *less* that quality improvement negatively affected their workload, having *higher* levels of confidence in the measurement of patient experiences with the Child HCAHPS survey, and receiving *more* frequent reports about these patient and family experience scores. Also, those reporting more openness in communication among nursing staff and more unit-level teamwork were less likely to experience burnout. Burned out nursing staff also reported more often than those without burnout that the hospital had worked on improving more aspects of the Child HCAHPS in the last year.

Roughly one quarter of our sample of pediatric inpatient nursing staff reported feeling burnout in the four-month timeframe of October 2019 through January 2020. This is lower than the 52% reported burnout for nursing staff pre-pandemic according to the State of Well-Being 2019 report (Frey, 2019), a comprehensive study of 30,355 unique health care workers (January 1 through December 31, 2019) including 3802 nursing staff across health care settings. The lower burnout rate observed in this study might be explained by geographical differences, given that burnout varies by geographic regions of the US with lower burnout for nurses in the West and higher reported nurse burnout in the Southeast (Shah et al., 2021). Furthermore, in a national US report including only inpatient registered nurses, the overall reported rate of burnout was 16% (which is lower than our sample) (King & Bradley, 2019), with 41% of unengaged nurses reported burnout and <8% of fully engaged nurses reported burnout, with also 50% of those nurses reporting burnout having no plans to leave. This same report also noted that nurses who experience burnout self-report a diminished capacity to care for themselves and their patients.

Our findings indicated higher burnout among nursing staff than the previous research from the Professional Research Consultants National Nursing Engagement Report (our sample: 27% vs 16% in the Professional Research Consultants study sample). In that report, a key finding was that unengaged nurses may or may not lead to turnover (King & Bradley, 2019), but did lead to poorer patient experiences, less compassion in care, and more missed workdays, hampering a hospital's ability to provide high-quality care (Bodenheimer & Sinsky, 2014; Leiter et al., 2018; Lown et al., 2016). The report also found that unengaged nurses look for a shift to end, are focused on the next break, and call off during times of stress. The report notes that unengaged nurses jeopardize morale, patient experiences of care, and quality and safety outcomes, all of which directly impact the bottom line. Lastly, fully engaged nurses are less likely to be burned out because they have the resources and support necessary to be successful in their work.

Our study extends this research by exploring how quality improvement relates to nurses being "fully engaged;" we found that nursing staff who were engaged by and included in quality improvement and those who experienced quality improvement efforts as integrated into patient care and did not feel that quality improvement negatively impacted their workload were less likely to experience burnout. We also found that nurses who reported burnout indicated that they received reports on pediatric/neonatal inpatient care experiences less often (less than quarterly) and also worked on more Child HCAHPS patient experience care domains in the last year than those not reporting burnout. Part of being engaged as a nurse may be moderated through nurses feeling valued as part of quality improvement such as discussions of data in regular reports, quality improvement strategies, possible ways to improve care, and the improvement efforts themselves that pertain to patient care and care experiences.

Additionally, we found that more unit-level teamwork was associated with less burn out and those nurses reporting more openness in communication among nursing staff (including supervisors and frontline staff) were also less likely to experience burnout. Communication across and among nurses including supervisors and frontline staff is key to nurses not feeling burned out. Nursing staff should specifically emphasize communication approaches that allow and encourage nurses to freely speak up if they see something that may negatively affect patient care and to ask questions when something does not seem right. Communication about possible problems with care delivery is needed to engage nurses and support them, which counteracts nurses feeling burned out. Moreover, when hospital staff report having teamwork and a culture of organizational learning and continuous improvement, patients assess the quality of their care as better (Sorra et al., 2014; Sorra & Dyer, 2010).

Practice implications

Communication among pediatric nursing staff about possible problems with care delivery is needed to engage and support nurses. Part of being engaged as a pediatric nurse may be experienced through discussing possible problems with care delivery, receiving data on patient and family experience of care metrics, and being valued in quality improvement activities. Supporting open communication among pediatric nursing staff, engaging nurses in quality improvement, and integrating quality improvement into patient care may decrease nurse burnout.

Table 2
Adjusted regression results for pediatric nurse measures grouped by hypothesis, by burned out vs not burned out.

Measures (M) (Domains or Single Items)	Burned out***	Not Burned out	P-value	Cohen's d
Ho 1: Importance of Quality				
M1: Perception of hospital priorities † (*5-point Agreement scale with α = 0.69) (three items)*	**Adj. Mean (SE) N = 25**	**Adj. Mean (SE) N = 69**	0.90	0.03
	3.83 (0.16)	3.85 (0.11)		
M2: Importance of organizational culture surrounding quality ++++ (*4-point Importance scale** with α = 0.85) (six items)*	3.66 (0.13)	3.80 (0.08)	0.22	0.29
M3: Importance of patient experience relative to other goals † (*3-point Less/Same/More Importance scale with α = 0.66) (three items)*	2.05 (0.15)	2.14 (0.10)	0.45	0.18
M4: Patient experience measures included in reports you received † (*Yes/No inclusion of ratings with α = 0.63) (3 items)*	0.02 (0.09)	0.06 (0.06)	0.63	0.12
Ho 2: Engagement in Patient Experience Measurement				
M5: ***Agreement on validity of Child HCAHPS scores*** † (***5-point Agreement scale* with α = 0.92)*** *Including following eight items:*	**3.22 (0.27)**	**3.79 (0.18)**	**0.023**	**0.56**
I am familiar with the Child HCAHPS survey results for our pediatric units and NICUs within "Named Children's Hospital"	3.40 (0.39)	3.73 (0.26)	0.34	0.25
Child HCAHPS measures the domains of patient experience that are most important to "Named Children's Hospital"	3.60 (0.35)	3.89 (0.23)	0.36	0.23
Child HCAHPS results accurately reflect the quality of patient experiences at "*Named Children's Hospital***"**	**2.39 (0.30)**	**3.61 (0.20)**	**<0.001**	**1.01**
Respondents of the Child HCAHPS survey at the hospital are representative of the patients our hospital serves	**2.99 (0.32)**	**3.70 (0.21)**	**0.014**	**0.59**
It is useful to compare Child HCAHPS scores to the scores of other hospitals that care for children	**3.44 (0.34)**	**4.05 (0.23)**	**0.046**	**0.50**
Child HCAHPS scores provide fair comparisons between hospitals that care for children	3.32 (0.32)	3.78 (0.21)	0.12	0.39
Child HCAHPS results provide information specific enough for use in quality improvement (QI)	3.58 (0.31)	3.96 (0.21)	0.17	0.35
"Named Children's Hospital" has enough resources to use Child HCAHPS data for QI	**3.26 (0.34)**	**3.92 (0.23)**	**0.033**	**0.52**
M6: Agreement on approaches that can improve Child HCAHPS scores † (*5-point Agreement scale* with α = 0.91) (twelve items)*	4.33 (0.21)	4.32 (0.13)	0.95	0.01
M7: Does "Named Children's Hospital" have specific, measurable performance targets for patient experience scores? † (Single Item with Yes/No scale)	**Proportion Yes**	**Proportion Yes**	0.52	0.16
	0.59 (0.14)	0.67 (0.09)		
M8: Do you receive internally generated reports containing information on patient experiences of pediatric and/or NICU inpatient care such as data from Child HCAHPS surveys quarterly or more often? † (Single Item with Yes/No scale)	**0.61 (0.13)**	**0.80 (0.07)**	**0.033**	**0.40**
M9: Do you receive internally generated reports containing narrative data from patient comments about patient experiences of pediatric and/or NICU inpatient care quarterly or more often? † (Single Item with Yes/No scale)	0.35 (0.14)	0.49 (0.10)	0.26	0.30
Ho 3: Attitudes Toward QI				
M10: Attitude about QI being essential +++ (*5-point Agreement scale* with α = 0.79) (two items)*	**Adj. Mean (SE)**	**Adj. Mean (SE)**	0.88	0.04
	4.61 (0.21)	4.58 (0.14)		
M11: QI efforts are integrated into patient care (vs. separate efforts). † (Single Item using a 5-point Agreement scale*)	**3.84 (0.21)**	**4.42 (0.14)**	**0.0028**	**0.70**
M12: QI efforts are a burden which negatively affect my workload. [R] † (Single Item using 5-point Agreement scale*)	**3.40 (0.24)**	**4.36 (0.16)**	**< 0.001**	**0.98**
Ho 4: Inclusion in QI				
M13: Inclusion in QI +++ (***5-point Agreement scale**** *with α = 0.72) Including the following two items:*	**Adj. Mean (SE)**	**Adj. Mean (SE)**	**0.0075**	**0.60**
	4.11 (0.19)	**4.56 (0.12)**		
I believe I have value in the institutional efforts to improve care.	**3.92 (0.22)**	**4.43 (0.15)**	**0.010**	**0.58**
I enjoy being a part of change on my unit to improve quality of care.	4.34 (0.20)	4.68 (0.13)	0.052	0.46
	Adj. Mean (SE)	**Adj. Mean (SE)**		
M14: Communication openness + (***5-point Agreement scale**** *with α = 0.62) Including following three items:*	**3.31 (0.25)**	**3.90 (0.16)**	**0.0086**	**0.62**
Staff freely speak up if they see something that may negatively affect patient care.	**3.56 (0.31)**	**4.23 (0.20)**	**0.017**	**0.58**
Staff are afraid to ask questions when something does not seem right.	**3.26 (0.31)**	**3.95 (0.20)**	**0.013**	**0.60**
Staff feel free to question decisions or actions of those with more authority.	3.10 (0.39)	3.51 (0.26)	0.24	0.28
M15: If I have an idea about how to make things better on this unit, the manager and other staff are willing to try it. (i.e., empowerment) † (Single Item using 5-point Agreement scale*)	3.21 (0.38)	3.47 (0.25)	0.44	0.18
Ho 5: QI Workload				
M16: Child HCAHPS domains that the hospital worked to improve in the last 12 months † (***Yes/No; 0.94***) *Including the following nineteen items:*	**Proportion Yes**	**Proportion Yes**		
	0.42 (0.08)	**0.18 (0.05)**	**<0.001**	**0.79**
Communication between parent/guardian and the child's nurses	**0.38 (0.14)**	**0.11 (0.05)**	**0.0038**	**0.64**
Communication between parent/ guardian and the child's doctors	**0.59 (0.16)**	**0.18 (0.07)**	**<0.001**	**0.87**
Communication about child's medicines	**0.38 (0.15)**	**0.15 (0.07)**	**0.030**	**0.57**
Keeping parent/ guardian informed about child's care	0.34 (0.16)	0.18 (0.08)	0.15	0.43
Privacy for parent/guardian when talking with doctors, nurses and other providers	0.57 (0.14)	0.39 (0.09)	0.13	0.37
Preparing child to leave the hospital	**0.25 (0.11)**	**0.10 (0.04)**	**0.048**	**0.38**
Keeping you informed about child's care in the ER	**0.82 (0.09)**	**0.57 (0.11)**	**0.031**	**0.50**
How well nurses communicate with child	0.39 (0.13)	0.20 (0.06)	0.054	0.43
How well doctors communicate with child	**0.66 (0.14)**	**0.30 (0.09)**	**0.0039**	**0.74**
Involving teens in their care	**0.53 (0.16)**	**0.27 (0.10)**	**0.045**	**0.54**
Preventing mistakes and helping parent/ guardian report concerns	0.26 (0.12)	0.10 (0.05)	0.066	0.38
Helping child feel comfortable	**0.19 (0.09)**	**0.07 (0.03)**	**0.041**	**0.34**
Responsiveness to the call button	**0.27 (0.11)**	**0.09 (0.04)**	**0.025**	**0.42**
Paying Attention to child's pain	0.10 (0.07)	0.04 (0.03)	0.20	0.21
Cleanliness of hospital room	**0.65 (0.13)**	**0.25 (0.09)**	**0.0017**	**0.90**
Quietness of hospital room	**0.41 (0.14)**	**0.19 (0.06)**	**0.037**	**0.47**
Visits with parent/guardian-doctor-nurse (i.e., rounding)	**0.20 (0.10)**	**0.06 (0.03)**	**0.045**	**0.38**
Overall rating of hospital	0.17 (0.08)	0.12 (0.04)	0.44	0.13
Willingness to recommend hospital	0.28 (0.10)	0.15 (0.05)	0.084	0.30

(continued on next page)

Table 2 (*continued*)

Measures (M) (Domains or Single Items)	Burned out***	Not Burned out	P-value	Cohen's d
Ho 6: Unit Culture and Adequate Staffing				
M17: Overall, our unit functions very well together as a team (i.e., unit-level teamwork)+++++ (Single Item using 5-point Agreement scale*)	**Adj. Mean (SE) 3.45 (0.26)**	**Adj. Mean (SE) 4.54 (0.17)**	**<0.001**	**0.91**
M18: Staff are committed to doing quality work.++ (Single Item using 5-point Agreement scale*)	4.42 (0.20)	4.63 (0.13)	0.23	0.27
M19: We have enough staff to handle the workload. (i.e., adequate staffing)+ (Single Item using 5-point Agreement scale*)	3.11 (0.35)	3.7 (0.23)	0.057	0.45
M20: Communication across transitions ^{R} *+ (5-point Agreement scale* with* $\alpha = 0.78$*) (two items)*	3.38 (0.32)	3.44 (0.21)	0.83	0.05

NOTE: *Italics* indicates a domain of aggregated items (highlighted as light grey rows). **Bold text** indicates statistically significant differences (p-value<0.05) from *t*-tests comparing adjusted means. Items within domains are listed only for statistically significant domains. ^{R} denotes reversed scored. *The 5-point agreement scale is: strongly disagree/somewhat disagree/neither agree or disagree/somewhat agree/strongly agree. **The 4-point importance scale is Not important at all/Low importance/ Moderate importance/ High importance. *** indicates Burned out versus Not Burned out is measured by the single Maslach Burnout Inventory item, which uses a five-category response scale: 1 = "I enjoy my work. I have no symptoms of burnout."; 2 = "Occasionally I am under stress, and I don't always have as much energy as I once did, but I don't feel burned out."; 3 = "I am definitely burning out and have one or more symptoms of burnout, such as physical and emotional exhaustion."; 4 = "The symptoms of burnout that I'm experiencing won't go away. I think about frustrations at work a lot."; and 5 = "I feel completely burned out and often wonder if I can go on. I am at the point where I may need some changes or may need to seek some sort of help."; where "Burned out" is defined by a respondent having a score of 3 or higher, resulting in a dichotomized (0/1) burnout scale of Burned out and Not Burned out. † indicates items on the CHFS survey developed for this study, cited in Quigley et al., 2021. + indicates an item on Patient Safety culture that is a subset of the HSOPSC Questions (HSOPSC=Hospital Survey on Patient Safety Culture). ++ indicates and item on commitment that is an item from the Gallup Q12 Employee Engagement survey. +++ indicates items from the QI Nursing Attitude Scale. ++++ indicates items from Quality Safety Assessment Application for Nurses (QSAAN). +++++ indicates an item from the perceived effectiveness scale from the Organizational Culture Inventory in Intensive Care Units.

Limitations

Our study has limitations. We studied one children's hospital nursing staff perceptions, so our findings may not be generalizable, but they are instructive given the limited research on pediatric QI efforts and burnout. Also, we are unable to tease out the direction of causation between quality improvement and burnout among nurses; further study is warranted.

Conclusion

As healthcare systems, including those that care for children, move to more value-based payment structures, they will increasingly rely on nurses in their quality improvement roles to make changes to support patient care and make improvements to care delivery and care experiences. We provide preliminary evidence that engaging pediatric nursing staff in quality improvement and integrating quality improvement into inpatient pediatric care is associated with decreased nurse burnout; one possible interpretation is that such engagement may decrease burnout. Unit-level teamwork and not feeling that quality improvement negatively impacts workload also decrease nurse burnout. Efforts at improving adequate staffing may not be specific enough to reduce burnout. Our study specifically points to the importance of quality improvement efforts that include having nursing staff receive frequent (at least quarterly) reports on patient experience metrics, integrate nurses into all levels of quality improvement activities, have quality improvement activities integrated into patient care, as well as emphasizing communication styles/patterns among all levels of nursing staff to allow nurses to raise any issues or possible problems they see with patient care. Further research is needed to examine the direction of the relationship between burnout and which aspects of quality improvement involvement drive down burnout and increase nurse involvement.

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Ethical considerations

Study protocols were approved by RAND's Human Subjects Protection Committee.

Credit statements

Dr. Quigley: conceptualized and designed the study; lead the development of the survey; analyzed and interpreted the data; drafted the article; revised the article critically for important intellectual content; and was involved in final approval.

Dr. Slaughter lead the analysis of the survey data; advised on the draft of the article; analyzed and interpreted the data; drafted the article; provided critical input and revisions to the article; and was involved in the final approval.

Dr. Gidengil assisted in developing the survey instrument; provided critical input and revisions to the article; and was involved in final approval.

Dr. Hays provided input and critical revisions to the article for important intellectual content; and was involved in final approval.

Nabeel Qureshi assisted in data collection.

Declaration of Competing Interest

None.

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