



2014

Are we providing patient-centered care? Preferences about paracentesis and thoracentesis procedures

Jeffrey H. Barsuk

Northwestern University Feinberg School of Medicine, jbarsuk@nmh.org

Sarah E. Kozmic

Northwestern University Feinberg School of Medicine, sarah.rottman@northwestern.edu

Jordan Scher

Northwestern University Feinberg School of Medicine, Jordan.amanda.scher@gmail.com

Joe Feinglass


Northwestern University Feinberg School of Medicine, j-feinglass@northwestern.edu

Aimee Hoyer

Northwestern University Feinberg School of Medicine, aimee.hoyer@gmail.com

See next page for additional authors

Follow this and additional works at: <https://pxjournal.org/journal>

 Part of the [Health and Medical Administration Commons](#), [Health Policy Commons](#), [Health Services Administration Commons](#), and the [Health Services Research Commons](#)

Recommended Citation

Barsuk, Jeffrey H.; Kozmic, Sarah E.; Scher, Jordan; Feinglass, Joe; Hoyer, Aimee; and Wayne, Diane B. (2014) "Are we providing patient-centered care? Preferences about paracentesis and thoracentesis procedures," *Patient Experience Journal*: Vol. 1 : Iss. 2 , Article 15.

Available at: <https://pxjournal.org/journal/vol1/iss2/15>

This Article is brought to you for free and open access by Patient Experience Journal. It has been accepted for inclusion in Patient Experience Journal by an authorized editor of Patient Experience Journal.

Are we providing patient-centered care? Preferences about paracentesis and thoracentesis procedures

Cover Page Footnote

We thank Drs. Doug Vaughan and Kevin O’Leary for their support and encouragement of this work. Funding: Drs. Barsuk, Wayne, and Feinglass, and Ms. Scher’s contribution on this project was partially supported by grant R18HS021202-01 from the Agency for Healthcare Research and Quality (AHRQ). AHRQ had no role in the preparation, review, or approval of the manuscript.

Authors

Jeffrey H. Barsuk, Sarah E. Kozmic, Jordan Scher, Joe Feinglass, Aimee Hoyer, and Diane B. Wayne

Are we providing patient-centered care? Preferences about paracentesis and thoracentesis procedures

Jeffrey H. Barsuk, *Northwestern University Feinberg School of Medicine, jbarsuk@northwestern.edu*

Sarah E. Kozmic, *Northwestern University Feinberg School of Medicine, sarah.rottman@northwestern.edu*

Jordan Scher, *Northwestern University Feinberg School of Medicine, jordan.amanda.scher@gmail.com*

Joe Feinglass, *Northwestern University Feinberg School of Medicine, j-feinglass@northwestern.edu*

Aimee Hoyer, *Northwestern University Feinberg School of Medicine, boyerac@upmc.edu*

Diane B. Wayne, *Northwestern University Feinberg School of Medicine, dwayne@northwestern.edu*

Abstract

Procedures performed at the bedside are as safe and less expensive than Interventional Radiology (IR) procedures. Patient preferences regarding location are rarely taken into account. Therefore, in this study we compared patient satisfaction with bedside and IR paracentesis and thoracentesis procedures, and identified reasons for patient location preferences. We performed a cross-sectional survey of medical inpatients undergoing paracentesis or thoracentesis procedures at a tertiary care academic medical center. The survey had eight domains: overall experience, pain control, expertise, courtesy, bedside manner of the physician, time required, explanation of risks/benefits, comfort and privacy. Patients were also asked about their preference for procedure location.

Two hundred and twenty surveys (162 paracentesis and 58 thoracentesis) were completed on 152 patients. Patient satisfaction was similar for bedside and IR procedures across all domains. A location preference was expressed in 151 surveys (68.6%). Thirty-five of 108 responses (32.4%) from patients with a paracentesis expressed a preference for bedside procedures while 73/108 (67.6%) responses expressed a preference for IR. Twenty-eight of 43 responses (65.1%) from patients with a thoracentesis expressed a preference for bedside procedures while 15/43 (34.9%) responses expressed a preference for IR. Comfort was listed as the most common reason for preferring the bedside while specialized equipment and safety were the most common reasons for preferring IR. Patients are equally and highly satisfied with bedside and IR paracentesis and thoracentesis procedures. Because both approaches are safe and effective, clinicians should pursue informed discussions with patients when a choice is available.

Keywords

Patient-centered care, patient satisfaction, thoracentesis, paracentesis

Note

We thank Drs. Doug Vaughan and Kevin O'Leary for their support and encouragement of this work. Funding: Drs. Barsuk, Wayne, and Feinglass, and Ms. Scher's contribution on this project was partially supported by grant R18HS021202-01 from the Agency for Healthcare Research and Quality (AHRQ). AHRQ had no role in the preparation, review, or approval of the manuscript.

Introduction

In 2001, the Institute of Medicine (IOM) described several factors associated with high quality patient care.¹ These factors include medical care that is safe, timely, effective, equitable, efficient, and patient-centered.¹ Multiple studies have evaluated these factors in regards to commonly performed medical procedures such as paracentesis (draining abnormal fluid from the abdomen)²⁻⁶ and thoracentesis (draining abnormal fluid from between the chest wall and lung).⁷⁻¹⁰ Both procedures can be performed either at the bedside or in

Interventional Radiology (IR) and earlier research showed that bedside procedures are as safe,^{3,10} more timely,^{3,4} and less expensive²⁻⁴ than IR procedures. Because of the potential to offer safer treatment, improve patient satisfaction, and reduce costs, it is critically important to involve patients in decision making about invasive procedures. Providing patients with information to help them select treatment at the bedside or in IR may potentially improve these outcomes. However, patient preference regarding procedure location is rarely taken into account, and clinical guidelines do not address procedure location.^{6,11}

Unfortunately, many clinicians equate providing patient-centered care as complying with patient requests for radiology examinations, medications, or laboratory studies even when they may not be needed or appropriate.^{12,13} However, the IOM defines patient-centered care as “respectful of and responsive to individual patient preferences, needs, and values and ensuring that patient values guide all clinical decisions.”²¹ Too often, when patients need invasive procedures such as paracentesis or thoracentesis, the healthcare system expects patients to comply with physicians’ decisions regarding how, when, and where the procedures are performed.¹³ Hospitalized patients are often not given options to make informed decisions about their procedure. Because invasive procedures occur frequently, this is a perfect opportunity to improve patient-centered care by understanding patient preferences and involving them in the decision-making.

Decisions surrounding care should be shared between clinicians and patients. However, it is unknown how often patients are involved in decisions regarding procedure location when more than one option is available. Furthermore, although hospitalized medical patients appear to be satisfied with bedside procedures,¹⁴ little is known about what influences patients’ decision-making and perceptions about commonly performed procedures such as paracentesis and thoracentesis. Understanding these preferences is important because earlier work suggests the decision whether to perform bedside or IR procedures is largely discretionary.^{2-4,10}

Patient satisfaction regarding hospital care is important because up to 30% of Value-Based Purchasing from the Centers for Medicare and Medicaid Services is based on results of the Hospital Consumer Assessment of Healthcare Providers and Systems patient satisfaction survey.¹⁵ The current study had two aims. First, to compare patient satisfaction with bedside and IR paracentesis and thoracentesis procedures. Second, to assess if patients prefer bedside or IR procedures and to identify reasons for this preference.

Methods

We performed a cross-sectional study of hospitalized medical patients undergoing a paracentesis or thoracentesis procedure at Northwestern Memorial Hospital (NMH) from May to November 2013. NMH is a tertiary care academic medical center with 894 inpatient beds. Medical patients undergoing paracentesis or thoracentesis procedures were surveyed about their experience. The Northwestern University Institutional Review Board approved this study and all participants provided informed consent.

Procedure

We used the NMH electronic medical record (EMR) to identify all medical inpatients who underwent a paracentesis or thoracentesis procedure during the study period. These procedures were either performed at the bedside by internal medicine residents or hospitalists or referred to IR. Medical inpatients included general internal medicine services and non-intensive care subspecialty medical services (hepatology, cardiology and hematology/oncology). These services were staffed by internal medicine residents and supervising faculty members or hospitalist attending physicians.

At NMH, clinicians must place an electronic order in the EMR for procedure kits, IR referrals, and laboratory analysis of paracentesis and thoracentesis fluid. We developed a real time EMR query that identified patients as clinicians entered orders for paracentesis or thoracentesis procedures or laboratory fluid analysis. Two authors (SEK, JS) monitored the electronic query daily and approached patients Monday through Friday to consent to participate in the study. Patients who did not speak English, were discharged before being approached, had delirium, dementia, or were acutely ill/unstable were excluded from the study.

Survey Development

We modified a previously published survey used to evaluate patient satisfaction with bedside procedures.¹⁴ The original survey instrument used a 5-point Likert scale and we adapted six questions from it regarding patient perceptions about overall procedure experience, pain control, expertise of the physician performing the procedure, time required to perform the procedure, explanation of risks and benefits, and courtesy and bedside manner of the physician who performed the procedure. In addition to these six questions, we added two questions about perceptions of comfort and privacy during the procedures. These eight questions (satisfaction domains) were rated on a 5-point Likert scale (1 = very dissatisfied; 5 = very satisfied).

We also added questions asking patients about prior procedure experience and if they had a preference for bedside or IR procedures. If the actual procedure was performed at the bedside, patients were asked: “If I told you that you could have your procedure performed by someone of equal expertise in a different location in the hospital, such as in Interventional Radiology, would you prefer to have your procedure in your hospital room or go to another location in the hospital, or do you not have a preference?” If the procedure was performed in IR, patients were asked: “If I told you that you could have the same procedure performed by someone of equal expertise here in your hospital room, would you prefer to have your

procedure in Interventional Radiology or in your room, or do you not have a preference?" Patients who preferred a specific location were asked to state reasons for their preference. In addition to free response, patients were given choices including physician expertise, specialized equipment, comfort, and safety. Patient preferences and reasons were compared between patients who had bedside and IR procedures.

All questions were written and reviewed for content and clarity by study authors and a medical social scientist with expertise in survey design. Survey questions were pilot tested for clarity on five sample patients and altered as needed for clarity. The survey instrument can be found in the Appendix. We calculated the Cronbach's alpha coefficient to evaluate internal consistency among all eight survey domains. Because the Cronbach's alpha was 0.88 for this scale, satisfaction scores were summed across all eight domains and then divided by eight to come up with a single 1-5 mean Likert satisfaction scale score.

Other Study Measures

We queried the EMR to obtain demographic and clinical information including: patient age, sex, race, body mass index (BMI), International Classification of Diseases, 9th Revision (ICD-9) codes associated with hospital admission, need for an ICU stay, and primary insurance type. We used ICD-9 diagnosis codes to calculate patients' Charlson scores. The Charlson score is a severity of illness indicator based on 19 chronic disease comorbidities and predicts one-year mortality for hospitalized medical patients.^{16,17} We used these demographic and clinical measures as covariates to evaluate satisfaction and preference differences by procedure location.

Analysis

We performed Chi square, t tests, or Mann Whitney U tests to analyze procedure satisfaction by patient demographic and clinical characteristics and to compare preferences between patients whose procedures were done at the bedside or in IR. We estimated the study sample size based on the ability to detect a hypothetical difference in a Likert scale satisfaction of about 20% between procedure locations. We based our power calculation on the expectation that approximately one-third of all paracentesis and thoracentesis procedures would be performed at the bedside. We used a two group continuity corrected chi square test with a $P = 0.05$ two-sided significance level and 80% power to detect the difference between a bedside proportion of very satisfied patients of 80% and an IR proportion of very satisfied patients of 60% (odds ratio of 2.7). The

sample size needed for comparing the proportion of patients who reported they were very satisfied overall between locations was 70 and 139 for each location respectively (a total sample size of 209). After examining actual satisfaction scores, we found that actual satisfaction scale data were even more rightward skewed than expected with a majority of patients expressing perfect scores of five across all eight domains. Because complete satisfaction is a meaningful goal for quality improvement, we dichotomized overall satisfaction into a perfect five or less than perfect (<5 overall score).

We used multiple logistic regression to test the significance of procedure location on the likelihood of a perfect five score across all eight domains, while controlling for the effects of patient demographic and clinical variables. A random effects logistic regression model was estimated to account for clustering of patients who underwent more than one procedure. Independent variables included patient age, sex, race, BMI, Charlson score, need for ICU stay, Medicaid or self-pay insurance, whether the patient reported previously having had the same procedure, and procedure type (paracentesis or thoracentesis). Finally, we performed chi square tests to compare patient preferences for bedside vs. IR procedures by procedure location for each procedure type.

Results

The EMR query identified 328 procedures performed during the study period. Ninety-seven procedures were excluded because the patient did not speak English, was discharged, had delirium, dementia, or were otherwise acutely ill (Figure 1). Therefore, 231 procedures (169 paracentesis, 62 thoracentesis) performed on 163 patients were eligible for the study. Eleven patients declined to participate in the study (seven paracentesis and four thoracentesis). The final sample was 152 unique patients who were surveyed regarding 220 of the 231 (95.2%) eligible procedures. One hundred and three patients underwent paracentesis procedures (77 patients had one procedure, 14 underwent two procedures, 4-three procedures, 7-four procedures, 1-six procedures) while 41 patients underwent thoracentesis procedures (35 patients had one procedure, 5 underwent two procedures, and 1-four procedures). Eight patients had both paracentesis and thoracentesis procedures (four patients underwent one paracentesis and one thoracentesis; three patients underwent two paracenteses and one thoracentesis; and one patient underwent one paracentesis and two thoracenteses.)

Figure 1: Flowchart showing study enrollment.

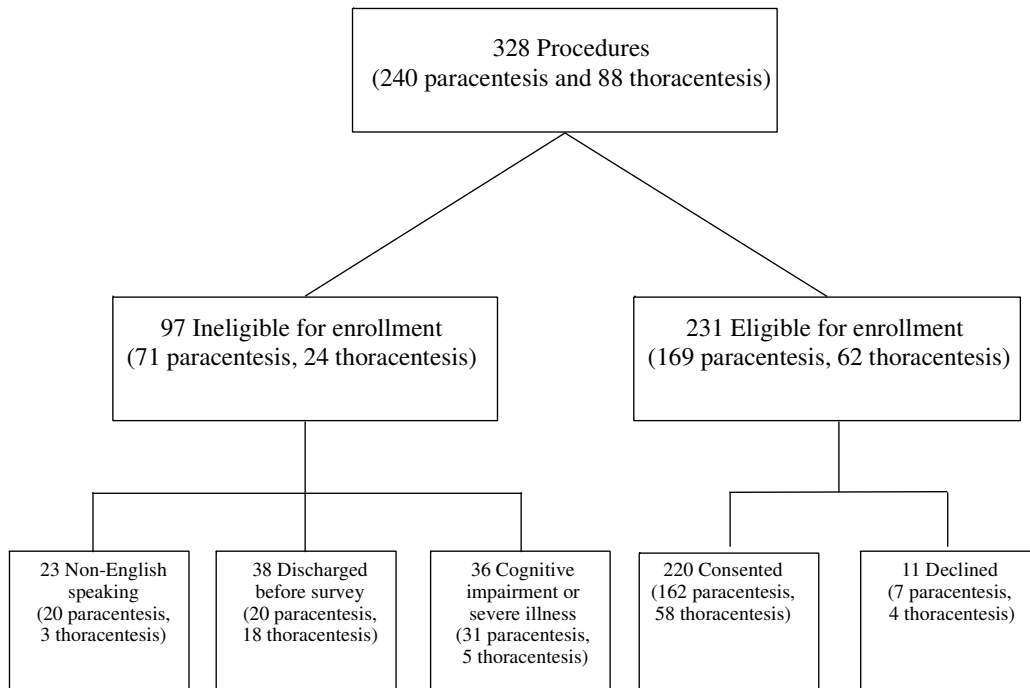


Table 1 displays demographic and clinical data. Age, sex, race, BMI, Charlson score, and insurance type did not differ significantly between bedside and IR patients. Patients who had an ICU stay were more likely to undergo bedside procedures (30/78, 38.5%) than IR procedures (36/142, 25.4%; $P = 0.04$). When including only the first survey response for each patient ($n=152$), it was significantly more common for paracentesis patients to report having a paracentesis in the past (75/111, 67.6%) than thoracentesis patients reporting a past thoracentesis (20/41, 48.8%; $P = 0.03$). Patients who had a previous paracentesis or thoracentesis procedure were more likely to undergo bedside procedures (66/78, 84.6%) than IR (92/142, 64.8%; $P = 0.002$).

Procedure Satisfaction

Table 2 displays patient satisfaction scores for each of the eight domains. Overall patient satisfaction was high. There were no statistically significant differences in overall procedure experience, pain control, physician expertise, time required to perform the procedure, explanation of risk and benefits, physician courtesy and

bedside manner, comfort during the procedure, and privacy during the procedure between bedside and IR procedures.

Logistic regression results showed no significant associations between the likelihood of a perfect overall satisfaction scale score and procedure location controlling for patient age, sex, race and ethnicity, BMI, Charlson score, need for ICU stay, type of insurance, whether the patient previously had the procedure, and procedure type.

Procedure Location Preference

A preference for procedure location (bedside vs. IR) was expressed in 151 of 220 surveys (69%; 108 paracentesis: 36 bedside and 72 IR; and 43 thoracentesis: 12 bedside, 31 IR). Of those with a preference, 63 (42%) showed a preference for bedside procedures while 88 (58%) showed a preference for IR. Overall, 112/151 (74%) of the surveys expressing a preference selected the location where the procedure was actually performed.

Table 1. Demographic and clinical data for patients who underwent paracentesis and thoracentesis procedures (n=220 procedures; 152 patients).

Attribute	Bedside procedures, n (%) n= 78	IR procedures, n (%) n= 142	Patient level, n (%) n=152
Age, years			
18-49	18 (23.1)	39 (27.5)	33 (21.7)
50-59	16 (20.5)	40 (28.2)	39 (25.7)
60-69	33 (42.3)	43 (30.3)	51 (33.6)
70+	11 (14.1)	20 (14.1)	29 (19.1)
Male	49 (62.8)	91 (64.1)	94 (61.8)
Procedure			
Paracentesis	61 (78.2)	101 (71.1)	111 (73.0)
Thoracentesis	17 (21.8)	41 (28.9)	49 (32.2)
Race (3.6% missing procedure level; 3.9% missing patient level)			
White	54 (69.2)	93 (65.5)	101 (66.4)
Black	11 (14.1)	26 (18.3)	28 (18.4)
Asian	2 (2.6)	3 (2.1)	4 (2.6)
Hispanic	7 (9.0)	16 (11.3)	13 (8.6)
Body mass index, kg/m ² (1.4% missing procedure level; 2.0% missing patient level)			
<25	28 (35.9)	61 (43.0)	63 (41.4)
25-29.9	23 (29.5)	46 (32.4)	43 (28.3)
≥30	25 (32.1)	34 (23.9)	43 (28.3)
Charlson comorbidity index			
0-2	17 (21.8)	33 (23.2)	38 (25.0)
3-5	46 (59.0)	68 (47.9)	68 (44.7)
6+	15 (19.2)	41 (28.9)	46 (30.3)
ICU stay*	30 (38.5)	36 (25.4)	38 (25.0)
Insurance (4.1% missing procedure level; 3.3% missing patient level)			
Medicare	34 (43.6)	52 (36.6)	63 (41.4)
Medicaid/Self pay	7 (9.0)	22 (15.5)	18 (11.8)
Private	34 (43.6)	62 (43.7)	66 (43.4)
Had procedure previously**			
Paracentesis*	54 (69.2)	72 (50.7)	75 (49.3)
Thoracentesis	12 (15.4)	20 (14.1)	20 (13.2)

* $P < 0.05$ comparing bedside and IR procedures

**first survey response (procedure) only for patient level (last column)

Analyzing each procedure separately, there were significant differences in location preferences. Thirty-five of 108 responses (32.4%) from patients with a paracentesis procedure expressed a preference for bedside procedures while 73/108 (67.6%) responses expressed a preference for IR procedures. Eleven of 36 responses (30.6%) from patients who had a bedside paracentesis indicated a preference for IR procedures. However, only 10 of 72 responses (13.9%) from patients who had an IR procedure indicated a preference for bedside procedures ($P < 0.0001$).

Twenty-eight of 43 responses (65.1%) from patients with a thoracentesis procedure expressed a preference for bedside procedures while 15/43 (34.9%) responses expressed a preference for IR procedures. Only one of 12 responses (8.3%) from patients who had a bedside thoracentesis indicated a preference for IR procedures. However, 17 of 31 survey responses (54.8%) from patients who had an IR procedure indicated a preference for bedside procedures ($P = 0.02$).

Table 2. Patient satisfaction with paracentesis and thoracentesis procedures (n=220 surveys/procedures; 152 patients). 1 = Very Dissatisfied; 5 =Very Satisfied. No patients rated Very Dissatisfied.

	Dissatisfied		Neutral		Satisfied		Very Satisfied	
	IR, percent n=142	Bedside, percent n=78	IR, percent n=142	Bedside, percent n=78	IR, percent n=142	Bedside, percent n=78	IR, percent n=142	Bedside, percent n=78
Overall procedure experience	0.0	0.0	6.3	7.7	14.8	21.8	78.9	70.5
Pain control	6.3	5.1	7.0	9.0	19.7	17.9	66.9	67.9
Physician expertise	0.0	1.3	4.2	2.6	10.6	9.0	85.2	87.2
Amount of time to perform procedure	2.1	1.3	5.6	3.8	12.0	10.3	80.3	84.6
Explanation of risks and benefits	0.0	0.0	3.5	3.8	10.6	5.1	85.9	91.0
Courtesy and bedside manner	0.0	0.0	2.8	2.6	7.0	3.8	90.1	93.6
Comfort	2.8	0.0	4.9	3.8	12.7	9.0	79.6	87.2
Privacy	0.0	0.0	4.2	2.6	12.7	10.3	83.1	87.2

All comparisons between bedside and IR were non significant.

Table 3 shows reasons why patients preferred bedside or IR procedures. Comfort was listed as the most common reason for preferring bedside procedures while specialized equipment and safety were listed as the most common reason for preferring IR procedures. As detailed above, 39 responses showed a preference for the opposite location from where the procedure was actually performed. Patients who had a bedside procedure yet preferred IR were more likely to believe that IR had more specialized equipment [3/12 (25%) vs. 0/27; $P = 0.02$], and that IR was a safer location [5/12 (41.7%) vs. 0/27; $P < 0.001$] compared to patients who preferred bedside. Patients who had an IR procedure yet preferred bedside were more likely to believe the bedside was a more comfortable location [27/27 (100%) vs. 1/12 (8.3%); $P < 0.001$] compared to patients who preferred IR.

Discussion

This study shows that patients were equally and highly satisfied with bedside and IR paracentesis and thoracentesis procedures. This finding has important

implications for patient care because to our knowledge this is the first study to directly compare patient perspectives of procedures performed in these locations. Earlier research shows that bedside procedures performed by highly trained clinicians are as safe or safer than IR.^{3,10} Use of a procedure service has also been shown to increase the number of bedside paracentesis and thoracentesis procedures with no increase in procedure-related complications.¹⁰ Bedside procedures also are more cost-effective as they are associated with fewer blood transfusions and ICU transfers and shorter hospital length of stay than IR procedures despite being performed on patients with a higher severity of illness index.^{3,4} Although earlier studies show that patients undergoing bedside procedures were satisfied with the communication, pain control and expertise of the physicians performing the procedure,¹⁴ our study adds additional information by demonstrating that patient satisfaction was equivalent with a bedside or IR approach.

Findings from the current study and earlier research^{3,4,10,14} demonstrate that bedside procedures are safe, cost-effective, and equally as acceptable to patients

Table 3. Reasons for location preference (n=151 surveys, excluding those who responded no preference).

	Prefer bedside, percent n=63	Prefer IR, percent n=88	P value
These doctors have the expertise I want	4.8	3.4	0.68
These doctors use specialized equipment	0.0	28.4	<0.001*
This location is more comfortable for me	93.7	8.0	<0.001*
I think this is the safest place for the procedure	0.0	55.7	<0.001*
Other	1.6	4.5	0.32

* $P < 0.05$

as IR procedures. Therefore, we believe that individual preferences should be more deeply examined and clinicians should pre-emptively explain options for bedside and IR procedures. The most common method that physicians convey information to hospitalized patients is through discussion during daily rounds. Yet, studies show that physicians typically spend very little time communicating with patients,¹⁸⁻²⁰ often provide more information than a patient can remember,^{21,22} and use complicated medical jargon.²³ In fact, hospitalized patients often do not know their diagnosis, medications, planned tests, and anticipated date of discharge.²⁴⁻²⁷ In order to provide safe, cost-effective patient-centered care, clinicians must deliver information more effectively. For example, when a choice of procedure locations (bedside vs. IR) is available, we believe an informed discussion of the safety and cost-effectiveness of bedside procedures should occur.

When comparing paracentesis and thoracentesis procedures, more patients who underwent paracentesis procedures stated a preference for IR procedures while patients who underwent thoracentesis procedures were more likely to prefer bedside procedures. We are not entirely certain of the reasons for these findings especially because bedside and IR procedures are technically identical at our institution. However, paracentesis patients were significantly more likely to have had at least one prior procedure. As many patients with severe liver disease require recurrent paracentesis procedures, it is standard practice at our institution for patients to have standing appointments with IR for outpatient fluid removal as needed. Therefore, patient familiarity with the IR facility and personnel may drive the IR paracentesis procedure location preference seen in this study. On the other hand, patients who undergo thoracentesis do not often require recurrent procedures as outpatients, as shown by the lower number of patients with prior thoracentesis procedures. The preference for bedside thoracentesis procedures may be reflected in the amount of fluid volume removed because clinicians performing bedside procedures at NMH are taught to drain all the fluid from the chest as long as the patient remains asymptomatic.^{28,29} IR policies are based on published guidelines and dictate that no more than 1.5 liters should be removed.¹¹ Patients receiving a bedside thoracentesis may therefore obtain more symptomatic relief than IR patients and this may contribute to the enhanced likelihood to prefer bedside procedures in this cohort. However, other differences between these groups may exist and account for differing opinions on location between patients undergoing paracentesis and thoracentesis procedures.

We also found that patients with a preference selected bedside and IR procedures for different reasons. Reasons were similar in the majority of patients who preferred the location in which their procedure actually occurred and in the minority who preferred the location where their procedure was not performed. Patients found bedside procedures to be more comfortable, likely because they did not have to travel to another location in the hospital. Further study is needed to explore this finding. Patients with a preference rated IR procedures as using more specialized equipment and believed IR was a safer location. Because the same equipment is used in both bedside and IR paracentesis and thoracentesis procedures, enhanced physician-patient communication is needed to address this perception. Additionally, a detailed discussion of equivalent safety in bedside and IR procedures is also needed to address the potentially inaccurate patient perceptions found in this study.

Performance of bedside procedures is challenging due to duty hour restrictions and suboptimal reimbursement relative to time requirements.³⁰⁻³² Current board certification policies do not include competency in paracentesis and thoracentesis procedures, and this may negatively impact the skills of graduating internal medicine and family medicine residents.^{33,34} Simulation-based mastery learning (SBML) is a highly effective method to boost residents' skills in procedures such as paracentesis and thoracentesis.^{35,36} SBML is a rigorous form of competency-based education in which all trainees must demonstrate a predetermined high level of skill prior to performing the procedure on actual patients.^{37,38} Rigorous SBML improves patient care outcomes in advanced cardiac life support,^{39,40} central venous catheter insertion,^{41,42} and paracentesis,³ and is highly cost effective.^{2,3,43} Because of the chain of evidence linking rigorous education to improved patient outcomes, we recommend that all clinicians complete SBML prior to performing bedside procedures.

Our study had several limitations. First, it was performed at one institution and may not reflect patient experiences in other settings. Second, it is possible that procedures were missed using our query although we believe that is unlikely. Although we did exclude some surveys of patients undergoing weekend procedures, we have no reason to believe that these patients were demographically different than any patients who underwent procedures during the week. Third, we surveyed patients as close to their procedure as possible to minimize recall bias. Most patients were surveyed on the same day as the procedure; however patients with weekend procedures were surveyed 1-2 days later. Fourth, we did not anticipate highly skewed procedure satisfaction scores and this affected the power

assumptions we made prior to the study. Yet, there were no trends towards differences in satisfaction between bedside and IR procedures. Additionally, we attempted multiple types of transformations of the satisfaction scores, but none transformed the data into a normal distribution that was appropriate for linear regression models. Therefore, we dichotomized data in two groups and performed logistic regression as described above. Fifth, we analyzed results at the procedure level and some patients had more than one procedure. We do not believe this changed our results as an analysis of only the first survey for each patient produced unchanged satisfaction scores. Additionally, we added prior procedures as a covariate in our regression analysis and used random effects analysis to account for clustering by procedure. Finally, we did not assess procedure outcomes and how this affects patient satisfaction and location preference.

In conclusion, this study showed that patients are equally and highly satisfied with bedside and IR paracentesis and thoracentesis procedures. However, patients with a preference for IR procedures believed that this location had more specialized equipment and was safer. As research shows that these locations are equally safe and use the same equipment, clinicians should pursue informed discussions with patients when a choice of location is available. Informing patients that bedside paracentesis and thoracentesis procedures use similar equipment, cost less, and are as safe as IR procedures could potentially reduce healthcare costs and improve patient comfort during these procedures. Patient perceptions regarding medical procedures should be addressed as part of the decision-making process.

References

1. Institute of Medicine (U.S.). Committee on Quality of Health Care in America. Crossing the quality chasm: a new health system for the 21st century. Washington, D.C.: National Academy Press; 2001.
2. Barsuk JH, Cohen ER, Feinglass J, et al. Cost savings of performing paracentesis procedures at the bedside after simulation-based education. *Simul Healthc*. 2014;In Press.
3. Barsuk JH, Cohen ER, Feinglass J, McGaghie WC, Wayne DB. Clinical outcomes after bedside and interventional radiology paracentesis procedures. *Am J Med*. 2013;126:349-56.
4. Barsuk JH, Feinglass J, Kozmic SE, Hohmann SF, Ganger D, Wayne DB. Specialties performing paracentesis procedures at university hospitals: Implications for training and certification. *J Hosp Med*. 2014;9:162-8.
5. Nazeer SR, Dewbre H, Miller AH. Ultrasound-assisted paracentesis performed by emergency physicians vs the traditional technique: a prospective, randomized study. *Am J Emerg Med*. 2005;23:363-7.
6. Runyon BA, Committee APG. Management of adult patients with ascites due to cirrhosis: an update. *Hepatology*. 2009;49:2087-107.
7. Feller-Kopman D, Walkey A, Berkowitz D, Ernst A. The relationship of pleural pressure to symptom development during therapeutic thoracentesis. *Chest*. 2006;129:1556-60.
8. Gordon CE, Feller-Kopman D, Balk EM, Smetana GW. Pneumothorax following thoracentesis: a systematic review and meta-analysis. *Arch Intern Med*. 2010;170:332-9.
9. Huang GC, Smith CC, Gordon CE, et al. Beyond the comfort zone: residents assess their comfort performing inpatient medical procedures. *Am J Med*. 2006;119:71 e17-24.
10. Lucas BP, Asbury JK, Wang Y, et al. Impact of a bedside procedure service on general medicine inpatients: A firm-based trial. *J Hosp Med*. 2007;2:143-9.
11. Havelock T, Teoh R, Laws D, Gleeson F, Group BTSPDG. Pleural procedures and thoracic ultrasound: British Thoracic Society Pleural Disease Guideline 2010. *Thorax*. 2010;65 Suppl 2:ii61-76.
12. Afsar-manesh N, Barsuk JH. Rational medical testing. *Hosp Med Clin*. 2012;1:e416-e26.
13. Berwick DM. What 'patient-centered' should mean: confessions of an extremist. *Health Affairs*. 2009;28: w555-w65.
14. Mourad M, Auerbach AD, Maselli J, Sliwka D. Patient satisfaction with a hospitalist procedure service: is bedside procedure teaching reassuring to patients? *J Hosp Med*. 2011;6:219-24.
15. Blumenthal D, Jena AB. Hospital value-based purchasing. *J Hosp Med*. 2013;8:271-7.
16. Deyo RA, Cherkin DC, Ciol MA. Adapting a clinical comorbidity index for use with ICD-9-CM administrative databases. *J Clin Epidemiol*. 1992;45:613-9.
17. Romano PS, Roos LL, Jollis JG. Adapting a clinical comorbidity index for use with ICD-9-CM administrative data: differing perspectives. *J Clin Epidemiol*. 1993;46:1075-9; discussion 81-90.
18. Becker G, Kempf DE, Xander CJ, Momm F, Olschewski M, Blum HE. Four minutes for a patient, twenty seconds for a relative - an observational study at a university hospital. *BMC Health Serv Res*. 2010;10:94.
19. O'Leary KJ, Liebovitz DM, Baker DW. How hospitalists spend their time: insights on efficiency and safety. *J Hosp Med*. 2006;1:88-93.
20. Tipping MD, Forth VE, O'Leary KJ, et al. Where did the day go?--a time-motion study of hospitalists. *J Hosp Med*. 2010;5:323-8.

21. Ley P. Giving information to patients. In: Eiser JR, ed. *Social Psychology and Behavioral Medicine*. Chichester, England: John Wiley & Sons; 1982:339-73.
22. Sandberg EH, Sharma R, Wiklund R, Sandberg WS. Clinicians consistently exceed a typical person's short-term memory during preoperative teaching. *Anesth Analg*. 2008;107:972-8.
23. Castro CM, Wilson C, Wang F, Schillinger D. Babel babble: physicians' use of unclarified medical jargon with patients. *Am J Health Behav*. 2007;31 Suppl 1:S85-95.
24. Calkins DR, Davis RB, Reiley P, et al. Patient-physician communication at hospital discharge and patients' understanding of the postdischarge treatment plan. *Arch Intern Med*. 1997;157:1026-30.
25. Cumbler E, Wald H, Kutner J. Lack of patient knowledge regarding hospital medications. *J Hosp Med*. 2010;5:83-6.
26. O'Leary KJ, Kulkarni N, Landler MP, et al. Hospitalized patients' understanding of their plan of care. *Mayo Clin Proc*. 2010;85:47-52.
27. Olson DP, Windish DM. Communication discrepancies between physicians and hospitalized patients. *Arch Intern Med*. 2010;170:1302-7.
28. Abunasser J, Brown R. Safety of large-volume thoracentesis. *Conn Med*. 2010;74:23-6.
29. Feller-Kopman D, Berkowitz D, Boiselle P, Ernst A. Large-volume thoracentesis and the risk of reexpansion pulmonary edema. *Ann Thorac Surg*. 2007;84:1656-61.
30. Duffy FD, Holmboe ES. What procedures should internists do? *Ann Intern Med*. 2007;146:392-3.
31. Thakkar R, Wright SM, Alguire P, Wigton RS, Boonyasai RT. Procedures performed by hospitalist and non-hospitalist general internists. *J Gen Intern Med*. 2010;25:448-52.
32. Wigton RS, Alguire P, American College of P. The declining number and variety of procedures done by general internists: a resurvey of members of the American College of Physicians. *Ann Intern Med*. 2007;146:355-60.
33. American Board of Internal Medicine. Internal Medicine Policies. Available at: <http://www.abim.org/certification/>. Accessed May 5, 2014.
34. American Board of Family Medicine Residency Requirements. Available at: <https://www.theabfm.org/cert/guidelines.aspx>. Accessed May 5, 2014.
35. Barsuk JH, Cohen ER, Vozenilek JA, O'Connor LM, McGaghie WC, Wayne DB. Simulation-based education with mastery learning improves paracentesis skills. *J Grad Med Educ*. 2012;4:23-7.
36. Wayne DB, Barsuk JH, O'Leary KJ, Fudala MJ, McGaghie WC. Mastery learning of thoracentesis skills by internal medicine residents using simulation technology and deliberate practice. *J Hosp Med*. 2008;3:48-54.
37. Cook DA, Brydges R, Zendejas B, Hamstra SJ, Hatala R. Mastery learning for health professionals using technology-enhanced simulation: a systematic review and meta-analysis. *Acad Med*. 2013;88:1178-86.
38. McGaghie WC, Issenberg SB, Cohen ER, Barsuk JH, Wayne DB. Medical education featuring mastery learning with deliberate practice can lead to better health for individuals and populations. *Acad Med*. 2011;86:e8-9.
39. Didwania A, McGaghie WC, Cohen ER, et al. Progress toward improving the quality of cardiac arrest medical team responses at an academic teaching hospital. *J Grad Med Educ*. 2011;3:211-6.
40. Wayne DB, Didwania A, Feinglass J, Fudala MJ, Barsuk JH, McGaghie WC. Simulation-based education improves quality of care during cardiac arrest team responses at an academic teaching hospital: a case-control study. *Chest*. 2008;133:56-61.
41. Barsuk JH, Cohen ER, Potts S, et al. Dissemination of a simulation-based mastery learning intervention reduces central line-associated bloodstream infections. *BMJ Qual Saf*. 2014;23:749-56.
42. Barsuk JH, McGaghie WC, Cohen ER, O'Leary KJ, Wayne DB. Simulation-based mastery learning reduces complications during central venous catheter insertion in a medical intensive care unit. *Crit Care Med*. 2009;37:2697-701.
43. Cohen ER, Feinglass J, Barsuk JH, et al. Cost savings from reduced catheter-related bloodstream infection after simulation-based education for residents in a medical intensive care unit. *Simul Healthc*. 2010;5:98-102.

Appendix

Complete by research staff and read to patient (circle responses):

You had a: paracentesis/thoracentesis procedure earlier today/yesterday
The procedure was performed to remove fluid from your abdomen/chest
The procedure was performed in interventional radiology/at your bedside

I would like to ask you some questions about your procedure.

Patient responses:

1. Have you ever had this procedure before? Yes _____ No _____
Now we are going to talk about your satisfaction with various items related to the procedure. Please answer the following questions using a scale from 1 to 5 where 1=very dissatisfied and 5=very satisfied.
(Note: Scale for Q1-Q9 was 1 = very dissatisfied 2 = dissatisfied 3 = neutral 4 = satisfied 5 = very satisfied)
2. How satisfied were you with your overall procedure experience?
3. How satisfied were you with the pain control during the procedure?
4. How satisfied were you with the expertise of the physician performing your procedure?
5. How satisfied are you with the time it took to perform the procedure?
6. How satisfied were you with the explanation of the procedure, risks and benefits before the procedure started?
7. How satisfied were you with the courtesy and bedside manner of the person who performed your procedure?
8. How satisfied were you with your comfort during and immediately after the procedure? (positioning, bed/cart)
9. How satisfied were you with your privacy during and immediately after the procedure?
10. If you had the procedure in IR:
Did you know it is possible to do this procedure safely at the bedside?
Y_____ N_____
If you had the procedure at the bedside:
Did you know it is possible to do this procedure safely in interventional radiology? This is an area of the hospital run by radiologists and their staff where procedures are done.
Y_____ N_____
11. If the procedure was in IR:
If I told you that you could have the same procedure by someone of equal expertise here in your hospital room, would you prefer to have your procedure in Interventional Radiology or in your room, or do you not have a preference?
Interventional radiology_____ Bedside_____ No preference_____
If the procedure was at the bedside:
If I told you that you could have your procedure by someone of equal expertise in a different location in the hospital, such as in Interventional Radiology, would you prefer to have your procedure in your hospital room or go to another location in the hospital, or do you not have a preference?
Interventional radiology_____ Bedside_____ No preference_____
12. You chose IR: Why? _____
You chose bedside: Why? _____
13. I'm going to list 4 reasons why people choose IR. Please tell me which of the reasons is most important to you
 - a. These doctors have the expertise I want
 - b. These doctors use specialized equipment
 - c. This location is more comfortable for me
 - d. I think this is the safest place for the procedure
 - e. Other _____
14. I'm going to list 4 reasons why people choose bedside procedures. Please tell me which of the reasons is most important to you
 - a. These doctors have the expertise I want
 - b. These doctors use specialized equipment
 - c. This location is more comfortable for me
 - d. I think this is the safest place for the procedure
 - e. Other _____