Prevalence and predictors of elevated liver enzymes among hospitalized adolescents with anorexia nervosa

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BACKGROUND

- The time course, evolution, and physiopathology of elevated liver enzymes during hospitalization for anorexia nervosa (AN) remains unclear.
- Wide range in the reported prevalence of elevated liver enzymes, from 0 to 76% in small studies
- Initial studies found that elevated liver enzymes were associated with lower BMI
- Whether the etiology of elevated liver enzymes stems from degree of malnutrition versus refeeding remains a source of debate.

AIM

The objective of this study was to analyze the prevalence, predictors, and evolution of elevated liver enzymes in a large sample of adolescents hospitalized with AN.

METHODS

Study Population

- Inclusion criteria: subjects 10-22 years of age with AN, first admitted to a tertiary children's hospital from January 2007 to December 2012
- Demographic factors, anthropometric factors, duration of illness, initial prescribed calories, and alanine aminotransferase levels (ALT) were recorded
- Dietary recall and prescribed caloric intake on the first day of the hospitalization were reviewed and recorded by a registered dietician

Statistical Analysis

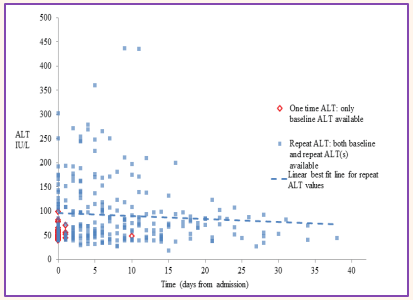
- Multivariate logistic regression was performed to assess the effect of degree of malnutrition , initial calories prescribed, age, sex, and duration of illness on elevated liver enzymes (ALT ≥ 40 IU/L).

RESULTS

Table 1. Demographic and clinical characteristics of sample upon first hospital admission for anorexia nervosa

	n	% / Mean	SD	Range
Demographics				
Sex (%)	356			
Female	317	89.0%		
Male	39	11.0%		
Race (%)	356			
White (non-Hispanic)	257	72.2%		
Hispanic	45	12.6%		
Asian	41	11.5%		
Black	3	0.8%		
Native American	2	0.6%		
Other	8	2.2%		
Age (years)	356	16.1	2.4	10.3-22.0
Clinical characteristics				
Duration of illness (years)	356	1.1	1.1	0.1-6.5
Body mass index on admission (kg/m^2)	356	15.9	1.9	9.1-20.7
Percentage median BMI on admission(%)	356	78.2	8.5	41.9-102.3
Dietary recall (kilocalories)	316	945.1	592.0	0-4200
Initial prescribed Calories (kilocalories)	355	1452.4	290.0	720-2800
Length of stay (days)	356	14.1	9.9	2-91
ALT on admission	338	45.4	35.5	12-360
ALT ≥ 40 IU/L on admission	125	37.0%		
ALT ≥ 80 IU/L on admission	21	6.2%		
ALT ≥ 40 IU/L at any point during hospitalization	139	41.1%		
ALT ≥ 80 IU/L at any point during hospitalization	1	0.3%		

Figure 1. Evolution of ALT throughout hospitalization for anorexia nervosa patients with elevated liver enzymes at admission



Other Laboratory Results

- Of the 14 patients who developed elevated ALT during the hospitalization, none of them developed hypophosphatemia.
- Testing for Hepatitis A, B, and C (2 patients), autoimmune hepatitis (1 patient), and celiac disease (4 patients) were negative.

ng patients hospitalized for anorexia nervosa

Variable	n	Univariate analysis Odds ratio (95% CI)	Multivariate analysis (excluding refeeding) Odds ratio (95% CI)	Multivariate analysis (including refeeding) Odds ratio (95% CI)
Age	356	1.05 (0.96-1.16)	1.05 (0.95-1.17)	1.04 (0.94-1.16)
Sex	356	0.52 (0.26-1.02)	0.44 (0.21-0.91)	0.45 (0.22-0.94)
Percentage median body weight on admission	356	0.96 (0.94-0.99)	0.96 (0.93-0.99)	0.96 (0.93-0.98)
Duration of illness	356	0.93 (0.76-1.14)	0.82 (0.63-1.06)	0.84 (0.65-1.09)
Initial prescribed calories (increments of 200)	356	1.12 (0.96-1.30)		1.13 (0.97-1.33)

Table 3. Odds ratios for determinants of developing ALT ≥ 40 after admission among patients hospitalized for anorexia nervosa

Variable	n	Univariate analysis Odds ratio (95% CI)	Multivariate analysis Odds ratio (95% CI)
Age	356	1.00 (0.80-1.25)	1.05 (0.82-1.34)
Percentage median body weight on admission	356	0.99 (0.93-1.05)	0.97 (0.91-1.04)
Duration of illness	356	0.75 (0.53-1.06)	0.78 (0.50-1.21)
Initial prescribed calories (increments of 200)	356	1.75 (1.05-3.18)	1.81 (1.04-3.18)

Abbreviations: CI, Confidence interval

RESULTS

Demographics

- A total of 356 subjects met eligibility criteria (age 16.1 ± 2.4; 89.0% female; admission BMI 15.9 ± 1.9; admission percentage median BMI (%mBMI) 78.2 ± 8.5).

Prevalence of Elevated Liver Enzymes

- Elevated liver enzymes were present in 37.0% on admission and in 41.1% at any point during the hospitalization.
- Lower %mBMI and male sex were significantly associated with odds of elevated liver enzymes on admission.
- Higher initial prescribed calories was associated with odds of elevated liver enzymes after admission.
- Among patients with elevated liver enzymes at admission (n=125), average ALT decreased by 0.7 each day

CONCLUSIONS

- In this largest study of AN and elevated liver enzymes to date, degree of malnutrition and sex predicted ALT ≥ 40 on admission but initial prescribed calories may also be associated with ALT ≥ 40 after admission in a small proportion of patients.
- ALT is known to be higher in males than females at baseline; therefore, males may be more likely to present with elevated liver enzymes as in this study
- Future research should better characterize the evolution of elevated liver enzymes in patients hospitalized with AN undergoing refeeding.

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STANFORD SCHOOL OF MEDICINE
Stanford University Medical Center

Addressing Summer Hunger: A Community-Campus Partnership

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Background

- Food insecurity (FI): reduced or lack of access to adequate food necessary for active, healthy living. (USDA)
- Household FI rates increase during summertime when children no longer receive reduced-price school meals. Especially challenging for underserved communities.
- *Program & Study Aims*: (1) To implement a 5-week summer meal program serving low income children and their families; (2) To examine barriers to utilization of local food resources.

Community Partners

RAVENSWOOD CITY SCHOOL DISTRICT (RCSD)

- 4,200 children in East Palo Alto and east Menlo Park, CA.
- Demographics: Hispanic (79%), African American (10%), Pacific Islander (9%), and other (2%). 93% are eligible for free or reduced-price lunch.

REVOLUTION FOODS

- Provided nutritious, fresh foods throughout the program

YMCA

- Administered the USDA's Summer Food Service Program (SFSP). Allowed for federal reimbursement of unlimited number of child meals.
- Co-led program implementation.

Project Description

QUANTITATIVE SURVEYS

- Objective: To track program participation and assess summertime change in risk for FI among enrolled families.
- Validated 2-item screen used to assess FI risk.
- Parents surveyed at beginning (N=105) and end (N=72) of 5-week meal program. FI risk over the past 30 days and over the past 12 months assessed.

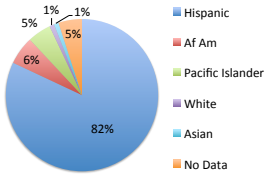
QUALITATIVE INTERVIEWS

- Objective: To examine awareness of community resources, barriers to resource access and utilization, and seasonality of FI.
- 5-10-min interviews conducted with parents (N=35) as they picked up children at the end of the day. Interviews performed by bilingual program staff. Analysis conducted using an iterative transcript-based coding and theme analysis process.

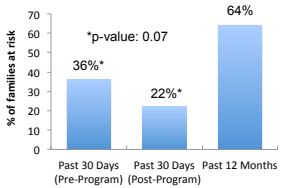
Quantitative Outcomes

Meals to children	# **Children** served daily	~270-370
	Total # of **child** meals served	14,769
Lunches for families & community	# **Adults** meals served daily	~4-30
	Total # of **adult** lunches served	259
Take-home meals for families	# Families served **take-home** meals daily	~170
	Total # of **take-home** meals served	~2,525

DEMOGRAPHICS



FOOD INSECURITY RISK



Qualitative Outcomes

DOMAIN 1: ACCESS TO COMMUNITY FOOD RESOURCES

Question: How do families access additional food resources in the community?

** Resources listed in order of priority*

1. Churches
2. Cal Fresh/ Food stamps Program
3. Community organizations (e.g. Boys & Girls Club, Senior Center)
4. "Don't know"
5. Second Harvest Food Bank

DOMAIN 2: BARRIERS TO FOOD RESOURCES

Question: Describe barriers families face accessing community resources?

• Transportation is barrier to access	→ *Living here is not like in Mexico, where you can get around without a car.*
• Lack of awareness and misinformation pervasive	→ *I've heard rumors, but I'm not sure exactly where to go.*
• Discouraging past experiences prevent utilization	→ *I went to get some help, but saw that the food was expired.*

DOMAIN 3: SEASONALITY OF FOOD INSECURITY

Question: Describe other times during the year when families struggle with not having enough money to buy food?

• When jobs are scarce/ During rainy seasons	→ *It's especially hard for people who work in construction or outdoors.*
• Winter and holidays seasons are toughest	→ *Buying gifts can get expensive; Bills are higher during the winter*
• Summer break poses burden of added food costs	→ *It's hardest when kids are on break because they stay home at eat more.*

Lessons Learned

KEY FINDINGS

- A high percentage of families enrolled in a summer school program were at risk of experiencing FI during the year.
- School serves as an effective location to support food security for children and families.
- Churches function as an important safety net for families struggling with not having enough money for food.
- Despite general awareness of local food resources, families face barriers to access and utilization of resources.
- Rainy and holiday seasons also pose economic hardships for families in need of extra assistance.

LIMITATIONS

- Lack of a control group prevented a thorough evaluation of the impact of the feeding program on reducing food insecurity.
- Sensitive nature of the topic may have prevented some participants from speaking candidly about access barriers.

Recommendations

- Given the extreme risk for food insecurity and multiple barriers to food access, an intensive multi-faceted community-level intervention continues to be warranted.
- Address the problem of food insecurity during other times of the year, beyond summertime.
- Conduct an experimental study comparing the intervention of the feeding program with a control group.

Acknowledgements

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How Well Do Residents Communicate with Patients?

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Background

- The ACGME requires programs to assess residents' communication skills.
- Communication Assessment Tool (CAT) is a validated measure of physicians' communication with patients.
- CAT has not been rigorously studied in pediatrics.

Objective

To implement the Communication Assessment Tool to compare residents' self-assessments with patient/guardian assessments of residents' communication skills.

Methods

- Cross-sectional, IRB-exempt study at Lucile Packard Children's Hospital.
- June 2014: A modified CAT with 14 5-point Likert-scale items was distributed to all pediatric residents to self-assess their communication skills.
- July-September 2014: 2 non-MD teams administered CATs by iPad or paper to admitted patients/guardians on designated units.
- Mean summary score for the patient/guardian CATs and the resident self-assessments was calculated per resident and class.
- Patient/guardian summary scores and resident self-assessment summary scores were compared with an unpaired t-test.
- Summary scores of each resident class were compared with one-way ANOVA.
- Difference between highest and lowest scoring self-assessment items was evaluated with a paired t-test.

Results

- 27 residents both received patient/guardian CAT reports and completed the self-assessment.
- Self-assessment scores were significantly lower than patient/guardian-reported scores: **Mean difference = 0.88, p<0.0001 (Fig. 1).**
- For the self-assessment, the highest-scoring item [#2, mean(SD) = 4.33(0.62)] and lowest-scoring item [#14, mean (SD) = 3.19(0.79)] were statistically different (p<0.0001).
- Patient/guardian CATs revealed no significant variation between item scores **(Fig. 2).**

Communication Assessment Tool Items

The resident physician…

1. Greeted me in a way that made me feel comfortable
2. Treated me with respect
3. Showed interest in my ideas about my (child's) health
4. Understood my (child's) main health concerns
5. Paid attention to me (looked at me, listened carefully)
6. Let me talk without interruptions
7. Gave me as much information as I wanted
8. Talked in terms I could understand
9. Checked to be sure I understood everything
10. Encouraged me to ask questions
11. Involved me in decisions as much as I wanted
12. Discussed next steps, including any follow-up plans
13. Showed care and concern
14. Spent the right amount of time with me

Figure 1: Patient/Guardian vs. Self-Assessment Summary Scores

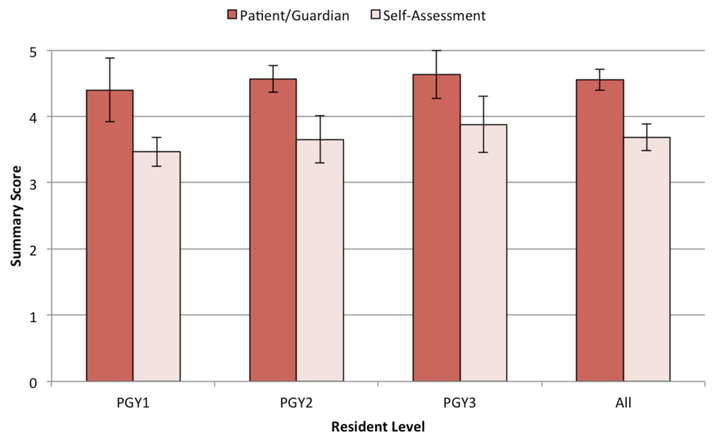
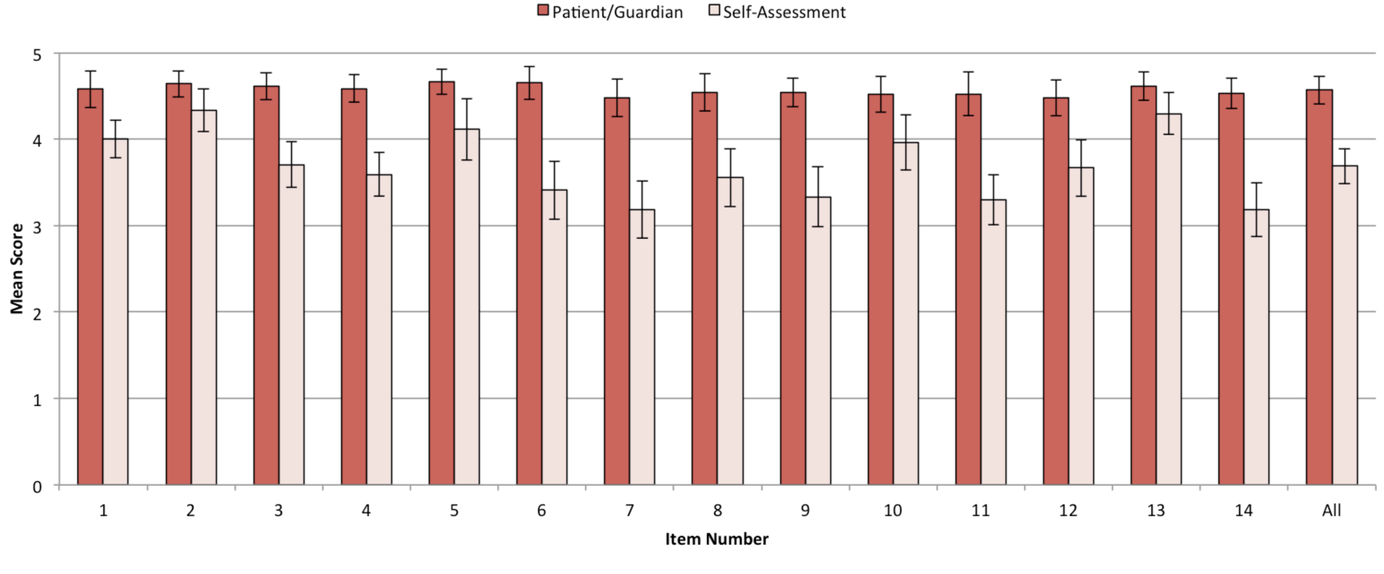


Figure 2: Patient/Guardian vs. Self-Assessment Scores by Item



Limitations

Bias:
- Variation in patient acuity
- English vs. Spanish
- Patient vs. Guardian

Power:
- Residents received only 1-9 CATs

Conclusions

- Pediatric residents underestimate their communication skills when compared to responses of patients/guardians.
- Residents feel they excel at treating patients/guardians with respect and need improvement with spending the right amount of time with them.

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Scholarly Concentrations: Developing Residents' Skills in Scholarship Through Structured Experiential Learning

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Stanford Children's Health, Lucile Packard Children's Hospital, Stanford University

Background

- A report of physician education by the Carnegie Foundation, *Educating Physicians: A Call for Reform of Medical School and Residency*, recommends the development of habits of inquiry and innovation as critical to reforming medical education
- The ACGME requires that all residency programs provide evidence of a scholarship-rich learning environment and opportunities for residents to engage in meaningful scholarly activities
- While many pediatric residency programs have scholarly requirements, few have formal curricula or infrastructure to support these activities while simultaneously fostering habits of inquiry and innovation
- Semi-structured interviews with PGY3 residents in 2012 revealed the need for a structured, longitudinal scholarly concentration program for residents

Objective

- To evaluate the feasibility and effectiveness of a required Scholarly Concentration program for all pediatric residents

Methods

- We measured the scholarly productivity of residents from the graduating classes of 2013-2015 following implementation of a robust, structured curriculum in 2012
- Since 2009, all pediatrics residents were required to complete a scholarly project during residency; in 2012, 6 concentrations were established that required 2-4 week rotations for skill development in research
- Scholarly productivity was measured by the number of completed projects, local presentations, regional and national presentations and awards received annually. Data were collected through an online annual resident survey and review of conference programs
- Feasibility and satisfaction data were also collected through our annual residency program survey

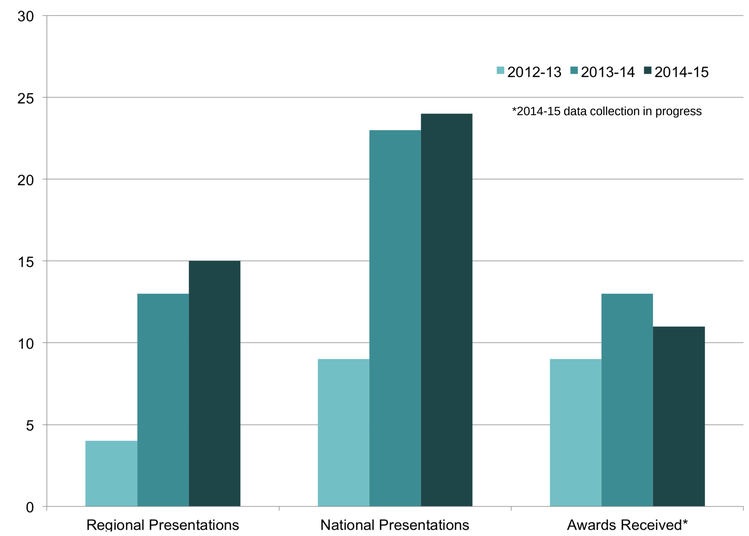
Program Goals and Description

- The goal of the Scholarly Concentration program is to develop leaders in pediatrics. The program encourages residents to:
  - **Experience a fundamental category of scholarship and recognize that creating, transforming and extending new knowledge are all valuable tenants of academic medicine**
  - **Gain a deeper understanding of the process of inquiry**
  - **Consider how continued scholarly work can fit into long-term career goals**
- Residents select 1 of 6 scholarly concentration areas in January of their intern year:
  - **Basic Science Research**
  - **Clinical Research**
  - **Community Engagement and Advocacy**
  - **Medical Education**
  - **Quality and Performance Improvement**
  - **Global Health**
- In their PGY2 and 3 year, all residents participate in core block rotations associated with their concentration of choice. These rotations (2-4 wks) expose residents to fundamentals of research design and methodology, as well as principles unique to their concentration (e.g., curriculum development, grant writing, improvement science and international health).
- In addition to these block rotations, residents participate in: a) Evening sessions to share "works-in-progress" with concentration leaders, research mentors and colleagues; b) Bimonthly noon conferences and c) Journal club
- Residents are evaluated on fulfillment of oral and written presentation of their project, which must be completed by the end of their PGY3 year. Presentations can be made at local (e.g., Stanford), regional or national forums.

Results

- From 2013-2015, 77/77(100%) graduating residents completed at least one scholarly project; only 4/77 (5.2%) switched concentrations after declaring mid-PGY1 year
- We have seen an increase in resident presentations and awards since implementation

Total Number of Presentations and Awards by Type and Year



- Survey data indicate the program has been well-received by residents. Curricular blocks, "works-in-progress" sessions and active involvement of SC leaders were noted to be particularly valuable to residents' learning
- The program has been a popular recruiting tool for the Residency program, as revealed by our intern selection survey

Conclusions and Future Directions

- A required, structured and longitudinal Scholarly Concentration program is feasible and has been effective in increasing the numbers of regional and national presentations among pediatric residents
- Core curricular rotations, individualized mentorship and required scholarly activity are three elements that can be adapted to other programs and levels of learners
- We are measuring the program's longitudinal impacts on scholarship, career trajectories and leadership activities in pediatrics

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SPANISH AND ENGLISH LANGUAGE SYMPOSIA TO ENHANCE PATIENT ACTIVATION IN PEDIATRIC INFLAMMATORY BOWEL DISEASE: A PILOT INTERVENTION

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Background

Patient activation is necessary to optimize health in patients with inflammatory bowel disease (IBD). The Patient Activation Measure (**PAM**) Score is a validated assessment of patient activation in adults but has not been formally studied in a pediatric IBD cohort. The purpose of PAM is to predict what level of support a patient needs based on their score. Higher PAM scores have been linked to better co-management of disease, including lower non-compliance rates to care plans. However, a known barrier to improving patient activation is limited English proficiency (LEP).

Objectives

1) To compare baseline PAM scores in both Spanish (SP) and English (ES) speaking cohorts of families affected by IBD
Hypothesis: Compared to ES-speaking IBD families, primarily SP-speaking Hispanic families with IBD are at higher risk of having lower activation/engagement scores.
2) To determine the feasibility and efficacy of a novel peer-group education symposium designed to enhance IBD self-management knowledge and skills
Hypothesis: Patient activation scores will likely increase after taking part in the educational program for both primarily SP and ES speaking patients.

Methods

- Pilot quality improvement intervention study focused on IBD family activation.
- Conducted search of the Stanford Children's IBD Center Patient Registry (~450 patients) to find eligible patients.
- A total of 10 primary SP and 21 ES families participated.
- Parallel IBD peer-group education symposia were conducted in SP and ES, including presentations on: ***"Patient and Parent activation and IBD 101," "Quality of Life, Nutrition and Exercise," "Medication Adherence and Family Dynamics."***
- The bilingual lecturer and moderator were the same for both groups.
- PAM scores obtained before & after the symposia in both groups for patients and parent(s).
- Descriptive statistics were used to assess effects of the intervention.
- Student t-tests were performed to obtain p-values and compare pre- and post-scores within and between groups.
- Chi-square tests were used to compare categorical data between the groups.

PAM Questionnaire

Table 1. Thirteen-Item PAM English

	Disagree Strongly	Disagree	Agree	Agree Strongly	N/A
1. When all is said and done, I am the person who is responsible for taking care of my health					
2. Taking an active role in my own health care is the most important thing that affects my health					
3. I am confident I can help prevent or reduce problems associated with my health					

Results

- Paired pre- and post-PAM scores were available from 24 patients (8 SP; 16 ES) and 41 parents (15 SP; 26 ES).
- Mean age for SP and ES patients was 11.6 and 12.0 years, and female gender in 80% and 62%, respectively.
- PAM scores uniformly increased for all four of the groups after the symposia (SP-patients 59.1 to 70.3, P=0.5; SP- parents 69.8 to 75.2, P=0.2; ES-patients 59.9 to 64.0, P=0.08; ES-parents 61.9 to 69.1, P=0.002).
- The incremental change from pre- to post-PAM scores in SP vs. ES groups was not statistically significant.
- When analyzing all participants, the mean pre-PAM score was 62.9 and the mean post-PAM score was 69.4; this aggregate increase represented a statistically significant change (<0.001).

Table 2. Participant Characteristics and PAM Scores

	Spanish Patients	English Patients	P-Value
Mean Age	11.6	11.95	0.812
Age at Diagnosis	9.2	9.95	0.633
%Female (n): %Male (n)	80% (8): 20% (2)	62% (13): 38% (8)	0.314
%UC (n): %CD (n)	80% (8): 20% (2)	38% (8): 62% (13)	**0.029**
%Gov't Subsidized Insurance (n)	90% (9)	4% (1)	**2.08x10-6**
Pre-PAM Mean	59.1	59.9	0.888
Post-PAM Mean	70.3	64.0	0.213
	Spanish Parents	**English Parents**	**P-Value**
Pre-PAM Mean	69.8	61.9	0.183
Post-PAM Mean	75.2	69.1	0.207

Table 3. Within-Group Comparison of Pre- vs Post-Symposium PAM Scores

	Pre-PAM Score	Pre-PAM SD	Post-PAM Score	Post-PAM SD	P-values
SP-Patients (n=8)	59.1	12.742	70.3	10.975	0.055
SP-Parents (n=15)	69.8	20.110	75.2	14.180	0.218
ES-Patients (n=16)	59.9	10.727	64.0	11.398	0.078
ES-Parents (n=26)	61.9	12.491	69.1	15.120	<0.001
All Participants	62.9	14.488	69.4	13.859	<0.001

Results (cont.)

Figure 1. Trends in Pre- vs Post-Symposium PAM Scores

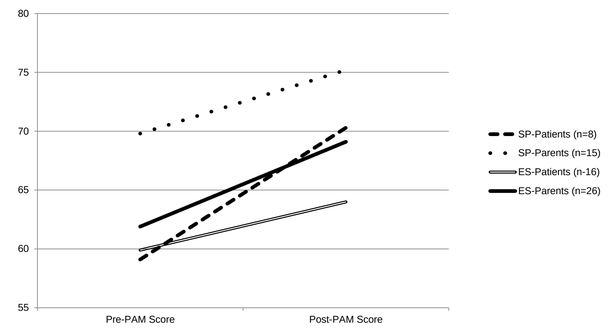
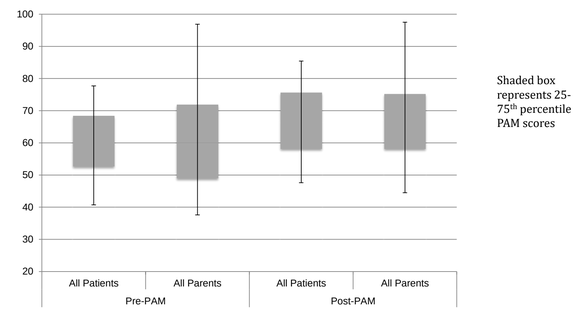


Figure 2. Pre- and Post-PAM Scores by Quartiles for all Parents and Patients



Conclusions

- We report the first successful pilot experience in assessing Patient Activation Measurement scores in pediatric IBD patients and their parents
- A family-centered, peer-group education symposium in either English or Spanish may be effective in enhancing patient and parent activation in families affected by pediatric IBD.

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Hearing Our Patients' Voices in Pediatric Education:
A Multi-Institution Resident Self-Assessment of Communication Skills With Patients

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Background

- The ACGME encourages residency programs to conduct milestone-based assessments that incorporate multiple sources, including the patient voice for the competency domain of communication and interpersonal skills.
- Resident attitudes toward and confidence in patient communication have not yet been published in pediatrics.
- The Communication Assessment Tool (CAT) is a validated measure of physician-patient communication that may be useful in evaluating residents in this domain.

Objective

To use a modified CAT to evaluate resident confidence in communication and attitudes toward patient and guardian feedback, then compare across PGY levels.

Methods

- Multi-institution cross-sectional IRB approved study.
- In June-August 2015, residents at Lucile Packard Children's Hospital Stanford, Phoenix Children's Hospital/ Maricopa Medical Center, and University of Chicago/Comer Children's Hospital completed an anonymous modified CAT with 5 point Likert-scale items measuring confidence in communication and attitudes toward patient and guardian feedback.
- We calculated individual resident composite means for confidence, then a composite mean for each PGY level. Means for resident attitudes were also calculated by PGY level.
- Data were analyzed using one-way ANOVAs.

Confidence Questions on Modified CAT **Indicate how well you think you communicate on the following tasks with patients and their guardians:**
1. Greeting them in a way that makes them feel comfortable.
2. Treating them with respect.
3. Showing interest in their ideas about their (child's) health.
4. Understanding their (child's) main health concerns.
5. Paying attention to them (looking at them, listening carefully).
6. Letting them talk without interruptions.
7. Giving as much information as they want.
8. Talking in terms that they understand.
9. Checking to be sure they understand everything.
10. Encouraging them to ask questions.
11. Involving them in decisions as much as they want.
12. Discussing next steps, including any follow up plans.
13. Showing care and concern.
14. Spending the right amount of time with them.

Table 1: Pediatric Resident Confidence Measures

PGY Level	Number of Residents	Mean Confidence	Standard deviation
PGY1	93	3.62	0.50
PGY2	80	3.68	0.48
PGY3	67	3.76	0.51

p= 0.09
Mean based on Likert scale 1-5
1 = Poor confidence, 5 = Excellent confidence in communication

Table 2: Mean Resident Attitudes Toward Patient/Guardian Feedback and Communication

Attitudes Regarding patient/guardian feedback (PGF)	PGY 1	PGY 2	PGY 3	p-value
Receiving PGF is important to my professional development	4.57	4.39	4.43	0.12
Communication with patients/guardians is important to quality patient care	4.95	4.83	4.77	**<0.01**
I ask patients/guardians for feedback on my communication skills	2.49	2.67	2.86	**0.05**
PGF increases my confidence in my communication skills	3.93	3.86	3.85	0.77
PGF changes the way I interact with other patients/guardians	4.16	4.01	4.17	0.27

Mean based on Likert scale 1-5
1 = Completely disagree, 5 = Completely agree with statement

Results

- 250/294 (85%) pediatric residents completed the survey.
- There was a general increase in confidence with increasing PGY level but no statistically significant differences were found using one-way ANOVA (PGY1: 3.62, PGY2: 3.68, PGY3: 3.76, p=0.09), Table 1.
- Across all PGY levels the highest-scoring item on the CAT was "Treating [patients] with respect" (4.27), while the lowest was "Spending the right amount of time with [patients]" (3.27).
- We found a statistically significant difference in two attitude questions (Table 2):
  - "Communication with patients/guardians is important to quality patient care." Agreement decreased with increasing PGY level (p<0.01).
  - "I ask patients/guardians for feedback on my communication skills." Agreement increased with increasing PGY level (p=0.05), but remained quite low.

Conclusions

- Residents' confidence in communication skills does not change significantly over the course of residency, however their attitudes toward patient communication and feedback decline in a concerning fashion.
- Next steps include exploring reasons for this decline and examining the relationship between patient/guardian assessment of resident communication skills with resident self-assessment.

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