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Physician Experiences with High Value Care in Internal Medicine Residency: Mixed Methods Study of 2003–2013 Residency Graduates

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Abstract

Phenomenon—High healthcare costs and relatively poor health outcomes in the United States have led to calls to improve the teaching of high value care (defined as care that balances potential benefits of interventions with their harms including costs) to physicians-in-training. Numerous interventions to increase high value care in graduate medical education were implemented at the national and local levels over the past decade. However, there has been little evaluation of their impact on physician experiences during training and perceived preparedness for practice. We aimed to assess trends in US physician experiences with high value care during residency over the past decade.

Approach—This mixed methods study used a cross-sectional survey mailed July 2014 – January 2015 to 902 internists who completed residency in 2003–2013, randomly selected from the American Medical Association Masterfile. Quantitative analyses of survey responses and content analysis of free-text comments submitted by respondents were performed.

Findings—A total of 456 physicians responded (response rate = 50.6%). Less than a quarter of respondents reported being exposed to teaching about high value care at least frequently (23.6% or 106/450). Only 43.8% of respondents (193/446) felt prepared to use overtreatment guidelines in conversations with patients, whereas 85.8% (379/447) felt prepared to participate in shared decision making with patients at the conclusion of their training and 84.4% (380/450) reported practicing generic prescribing. Physicians who completed residency more recently were more likely to report practicing generic prescribing and feeling well prepared to use overtreatment guidelines in conversations with patients ($p < 0.01$ for both).

Insights—In a national survey, recent US internal medicine residency graduates were more likely to experience high value care during training, which may reflect increased national and local efforts in this area. However, being exposed to high value care as a trainee may not translate into

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specific tools for practice. In fact, many US internists reported inadequate exposure to prepare them for patient discussions about costs and the use of overtreatment guidelines in practice.

Keywords

internship and residency; health care costs; physician survey; delivery of health care; high value care

Introduction

Geographic variation and rapid growth of healthcare spending in the US have led to increasing concerns that physicians receive inadequate training on high value care,^{1–3} defined as care that adds value after assessing benefits, harms, and costs of medical interventions.⁴ Efforts to improve this area of physician training resulted in the addition of cost-effective care as a competency for internal medicine residents by the Accreditation Council for Graduate Medical Education (ACGME),⁵ and the development and dissemination of the High Value Care curriculum by the American College of Physicians.⁶

While the recent national initiatives made high value care teaching during residency salient, it is important to understand the preceding and informal mechanisms whereby such learning was already ongoing. Although national efforts were introduced in 2012, the adoption of high value care training into local residency program practice varied in terms of timing. For example, a 2012 survey of US residency programs reported that only 15% had a formal curriculum on high value care.⁷ Furthermore, reports suggest a mismatch between formal reported curricula and trainee experience of an informal curriculum. Some reports have found that more informal teaching at the bedside or role modeling by the attending physicians may be a more effective approach to high value care education.^{8–10} A 2012 survey of US internal medicine residents and program directors found that role modeling of high value care was much more prevalent than formal curriculum with approximately half of respondents reporting that their faculty consistently model high value care.¹¹

Assessing trainee experiences prior to the introduction of more systematic national initiatives would inform our understanding of how academic medical centers implement educational innovations in the workplace. Within the conceptual framework of workplace learning, we know that the quality of learning is determined in large part by the ability of learners to engage formal and informal supports within the scope of their work.¹² While existing studies reported on the general aspects of high value care teaching, such as availability of a formal curriculum and modeling by attendings, there is little data on practicing physicians' perceptions of their preparedness to practice specific skills related to high value care. Furthermore, existing studies surveyed residents during training, when they may lack practical experience to provide insight into the skills required to practice high value care independently.

To understand what supports were available to learners, we surveyed US internal medicine residency graduates who completed training over the past decade to describe longitudinal trends in physician experiences and specific aspects of teaching during residency pertaining to high value care. Our objectives in this mixed methods study were to: 1) describe recent

US internal medicine residency graduates' perceptions of their experiences in residency related to high value care; 2) evaluate training program characteristics and time trends associated with specific high value care related experiences during training; and 3) elicit common themes raised by the respondents regarding their experiences with high value care during training.

Methods

Conceptual Framework

For this study, we adopted the definition of high value care as care that adds value after assessing benefits, harms, and costs of medical interventions.⁴ To characterize key components of high value care training, we reviewed the literature for relevant original research, policy statements and editorials that described existing or proposed interventions to improve high value care in training. Next, we developed a list of relevant concepts for survey development. After a series of iterative discussions and consultations with outside experts, the authors reached a consensus on the following list of concepts for survey development: culture or environment during training (influence of attendings, administrators, program directors),^{8,9,13} awareness/knowledge of costs of care,¹⁴ avoiding unnecessary or low value testing,¹⁵ cost-effective prescribing, and efficient practice (e.g. use of overtreatment guidelines,¹⁶ ability to work with interprofessional partners, shared decision making skills).¹⁷ These concepts formed the foundation for survey item development described below.

Survey Development

There are no published instruments evaluating physician experiences in residency related to high value care. To identify potential items for cognitive testing, we searched PubMed for relevant survey studies and interviewed experts in medical education and survey design. Items were developed to assess (1) frequency of exposure to experiences related to the practice of high value care such as generic medication prescribing and providing a justification when ordering tests; and (2) perceived preparedness to use tools related to high value care such as overtreatment guidelines and shared decision making. We conducted two cycles of cognitive pilot testing with experts as well as broader pilot testing with 100 internal medicine physicians randomly selected from the American Medical Association (AMA) Masterfile. The final survey included questions about physician demographics, practice characteristics, and experiences in residency related to high value care training (Appendix A).

Study Sample

The survey sample and implementation were previously described.¹⁸ Using the AMA Masterfile, we prescreened 2,170 randomly selected internal medicine physicians who completed training within the last 10 years to confirm qualifying specialty (internal medicine), mailing address, and that the physician was actively seeing patients at least 20 hours a week. The final sample included 902 internal medicine physicians who were mailed a paper survey between July 2014 through January 2015 using a modified Dillman method.¹⁹ The initial mailing was done by first class mail accompanied by a \$2 bill and followed by two reminder mailings approximately 6 weeks apart.

Residency High Value Care Scale

Nine questions assessed physicians' experiences during residency training related to high value care. Six questions focused on how often: (1) attendings discussed costs of care, (2) attendings questioned the necessity of a workup, (3) residents were exposed to teaching about high value care; (4) residents were aware of costs of care; (5) residents had to justify tests that they ordered; and (6) residents prescribed generic medications. These were assessed using a five-point scale of frequency. Three questions assessed how prepared respondents felt at the completion of residency to: (1) use overtreatment guidelines, (2) manage interprofessional partners (i.e., advanced practice nurses and physician assistants), and (3) participate in shared decision making with patients. These were measured using a four-point scale of agreement. Overtreatment guidelines were described in the survey as guidelines that focus on tests and procedures that are considered overused in healthcare (such as the Choosing Wisely Campaign).²⁰ To summarize physician experiences related to high value care during training, we developed an 8-item Residency High Value Care (RHVC) scale, using standard factor analysis techniques (Appendix B). One item (interprofessional partners) was conceptually distinct from the other eight questions, which was reflected in low correlations, and was not well coherent with our *a priori* objectives. This item was therefore omitted. The eigenvalues suggested a one-component solution (1st eigenvalue 3.28, second 0.36). The Cronbach's alpha for the 8-item RHVC scale in the current study sample was 0.84 and rotated loadings were 0.40–0.84. The RHVC total scale possible values ranged between 8 and 38. Higher scale scores reflected higher degree of high value care training in residency.

Analysis

The American Association for Public Opinion Research RR2 was used to measure response rate.²¹ Individual survey item responses were dichotomized into “frequently/always” vs. others for items measuring frequencies and into “strongly/moderately agree” vs. “strongly/moderately disagree” for items measuring agreement. To assess time trends for individual items, respondents were stratified into three roughly equal cohorts by year of residency completion: 2003–2005, 2006–2009, and 2010–2013. We used the χ^2 test to compare responses between these groups.

Multivariable linear regression was used to test association between program characteristics and the overall RHVC scale score. The dependent variable was each respondent's RHVC scale score (a continuous variable). Independent variables tested included physician gender (male or female), time since completing residency training (number of years), region of residency program location (South, Midwest, Northeast, or West), training program type (non-mutually exclusive categorical variables for university-affiliated, community, primary care track, and research track), and self-reported burnout at the completion of residency training (yes or no). Our dependent variable was the RHVC scale score measured on a continuous scale, therefore we can interpret the beta coefficients as representing the difference in the number of points on the RHVC scale independently associated with each independent variable, after accounting for the other variables in the model.

We also conducted content analysis of comments entered into the free-text portion of the survey in response to the prompt: “Is there anything else you want to add regarding your training experience?” Comments were double-coded using content analysis, with two authors (K.R. and E.K.) independently reviewing all comments in an iterative manner. After initial review, the authors discussed the proposed themes and subcategories reaching consensus on the final codebook. All items were again reviewed independently and any differences were discussed and adjudicated. Comments containing multiple themes were coded separately.

Data management

Responses were entered into REDCap electronic data capture tool hosted at the University of Pennsylvania.²² Ten percent of entries were double entered with perfect concordance. The data were then exported into and all analyses were conducted using STATA version 13.0 (StataCorp, College Station, TX).

This study was reviewed and approved by the University of Pennsylvania Institutional Review Board.

Results

The survey response rate was 50.6% (456/902). Among the respondents, 29.9% (136/455) practiced in a hospital-owned practice, 29.2% (133/455) in group private practice, and 13.2% (60/455) in academic faculty practice. Majority of respondents (68.6% or 313/456) self-characterized their residency program as university-affiliated, and 37.9% (173/456) characterized it as a community-based program. Primary care track graduates represented 17.3% (79/456) of the respondents. Other characteristics of the respondents’ demographics, current practice and residency training are reported in Table 1.

Responses to items about physicians’ exposure to experiences related to high value care during training are shown in Table 2 (top half). Physicians reported wide variation in the frequency and types of exposure to high value care training during residency. Most (84.4% or 380/450) reported prescribing generic medications when available frequently or always. Of the respondents, 46.7% (209/448) reported being expected to justify tests that they ordered and 47.6% (214/450) reported being questioned by an attending about the necessity of a workup frequently or always. Only 23.6% (106/450) were exposed to teaching about high value care at least frequently, 21.6% (97/450) to discussing costs of care with their attendings, and 19.9% (89/448) were aware of costs of care for their patients.

Responses to items about physicians’ perceived preparedness for practice are shown in Table 2 (bottom half). Only 43.8% (193/446) respondents felt prepared to use overtreatment guidelines in conversations with patients whereas 85.8% (379/447) felt prepared to participate in shared decision making with patients at the conclusion of their training. Respondents who completed training more recently were more likely to report prescribing generic medications and feeling prepared to use overtreatment guidelines in conversations with patients than earlier cohorts ($p < 0.01$ for both).

Overall, 53.3% (240/450) respondents reported that their practice style in residency was less cost-conscious compared to their current practice style, while 19.1% (86/450) reported that their practice style in residency was more cost-conscious. The mean Residency High Value Care (RHVC) score was 24.6 (SD 4.8, range 9–38, with higher scores reflecting greater cost-consciousness). Physicians who trained in a primary care track or program were more likely to score higher on the RHVC scale ($\beta=2.22$, 95% CI 1.01–3.43, $p<0.01$), whereas residents who trained in the Northeast ($\beta=-1.21$, 95% CI -2.38–0.04, $p=0.04$, reference: South) and those who felt burned out at the completion of training ($\beta=-0.52$, 95% CI -1.00–0.04, $p=0.03$) were more likely to score lower on the scale. Each additional year since completing residency was associated with -0.34 point lower RHVC scale score ($\beta=-0.34$, 95% CI -0.49–0.18, $p<0.01$) (Table 3).

Ten percent of respondents (47/456) provided comments that related to high value care of their training. Qualitative comment content analysis revealed five themes and nine subcategories that recurred. Examples of qualitative comments categorized by theme and subcategory are presented in Table 4. The most common theme from content analysis of free-text comments were about the quality of alignment of systems during training with cost conscious care, defined as characteristics of local health system(s) that facilitated or impeded high value care. For example, the statement “since we had to transport and draw our own labs post am blood draw, you ordered everything anyone might want everyday to prevent having to draw blood” exemplified poor alignment. Approximately the same proportion of free-text comments reported good alignment between systems during training and high value care (30% or 14/47) as poor alignment (32% or 15/47). One in five commenters (19% or 9/47) expressed concern about not receiving adequate training on cost-effective care. Other themes included malpractice litigation as a barrier to cost-conscious training and conflict between the hospital/healthcare system vs. the patient being the beneficiary of cost-savings. A minority of free-text comments described medical training as incompatible with high value care: 6% (3/47) of commenters felt that patient-centered care precluded consideration of costs and 11% (5/47) felt that goals of training were in conflict with high value care.

Discussion

In this national survey of US internal medicine physicians who completed residency training in the past decade, respondents reported mixed experiences with high value care training during residency and their self-perception of preparedness to practice high value care varied. For example, most physicians reported prescribing generic medications, but only one in five respondents reported being aware of costs of care for their patients. With regard of self-perceived preparedness for practice, most respondents felt prepared to use shared decision making with patients but less than half felt prepared to use overtreatment guidelines in patient discussions. Nevertheless, we observed positive trends over time, with physicians who graduated more recently reporting greater comfort with overtreatment guidelines and generic prescribing as well as higher scores in a global measure of residency high value care training. Overall, we found that residents with more high-value care experiences left residency more comfortable with the application of high value practices.

While most physicians reported ordering generic medications when available, some aspects of high value care were rarely reported. For instance, only about one in five respondents reported being aware of costs of care or discussing those with their attendings. Similarly low rates of awareness of costs of care were observed in prior studies. In a 2012 national survey of US internal medicine residents, only one in four respondents reported sharing cost information with their patients.⁸ This evidence further documents the deficit in the availability of cost information to trainees. The lack of price transparency in healthcare might be particularly important during training because practice patterns and attitudes toward cost-effective care developed during training persist in independent practice.^{23,24} For example, a 2012 survey of practicing U.S. physicians found an inverse correlation between a physician's attitudes toward cost-consciousness and the hospital care intensity index of the physician's training program.²³ And an analysis of Medicare billings by general internists and family physicians who completed residency training 1992–2010 found that spending patterns of the region where a physician completed residency were correlated with the physician's subsequent spending in independent practice.²⁴

While this survey observed deficiencies in some aspects of high value care, we found higher report of generic prescribing by more recent graduates. These findings likely reflect an increased emphasis on generic prescribing including role-modeling by attending physicians, mandatory generic substitution, and efforts to include generics in hospital formularies. A review of interventions to improve physician training in high value care found that effective information transfer, reflective practice, and supportive institutional environment are the key factors in the success of educational interventions in this area.¹³ Consistent with those findings, generic prescribing represents a specific tool in the high value care toolkit that has gained ground over the past decade through widespread knowledge dissemination, modelling by attendings,²⁵ and favorable institutional environment supportive of generic prescribing.

We also found heterogeneity in the perceived preparedness to apply tools associated with high value care in practice. While most respondents felt prepared to practice shared decision making, less than half were comfortable using overtreatment guidelines in discussions with patients. The greater self-perceived preparedness to use overtreatment guidelines in practice by more recent graduates may reflect increased dissemination of such guidelines. For example, the Choosing Wisely initiative by the American Board of Internal Medicine Foundation was launched in 2012.

We observed several associations between RHVC scores and program characteristics. Our finding that training in the primary care track was associated with greater overall RHVC scores was consistent with a prior study that found that training in the primary care track was associated with generic prescribing in residency.⁹ Furthermore, we also found an inverse association between RHVC scores among graduates of residency programs in the Northeast, which suggests heterogeneity in high value care experiences across programs. Together, the associations with geography and primary care may both provide further evidence of the importance of institutional environment and informal curriculum in high value care training. We also observed that respondents who reported feeling burned out at the completion of residency scored slightly lower on the RHVC scale. Self-reported burn out was shown to be

associated with suboptimal patient care practices in prior studies. For example, a 2002 study of internal medicine residents found that residents who reported burn out were less likely to “fully discuss treatment options or answer patients’ questions”.²⁶ Further research is needed to better evaluate the link between trainee burn out and high value care.

Content analysis of free text comments provided by the respondents highlighted several themes related to a “hidden curriculum” that residents experience during training. In particular, some respondents in our study reported that their training was negatively affected by malpractice concerns expressed by their attendings or hospital administrators. These findings highlight a persistent concern among US physicians and an important barrier to more high value care training. A well-documented driver of overuse among practicing physicians, malpractice concerns among trainees who are generally protected against malpractice litigation during training appear to be on the rise. A 2012 qualitative study of medical students’ narratives found that fear of missing something was the second most commonly cited barrier to high value care,²⁷ and a 2015 survey of 3,395 US medical students reported that 58% agreed that ordering fewer tests would increase the risk of malpractice.²⁸ Even among practicing physicians, who generally face a greater risk of malpractice litigation than trainees, developing evidence suggests that physician perceptions greatly exaggerate malpractice risk and that perceptions rather than true costs of malpractice drive overutilization.²⁹ Thus, efforts to address those misperceptions directly during training may be effective in improving high value care practices.

Respondents also expressed confusion regarding their role in high value care depending on the potential beneficiary of cost-containment efforts. In fact, many comments volunteered by the respondents adopted a very broad interpretation of high value care that includes not only balancing financial costs but also time and overall value from different perspectives. For instance, one respondent commented that “during my training at a large private hospital patients were discharged quickly ... but during my training at a VA hospital patients were routinely kept inpatient for outpatient workups. This was partly because it took months to see a specialist [as] outpatient in the VA but only weeks in the private sector.” Many US internal medicine residents rotate through more than one hospital during their training, and those training facilities often differ in their incentive structures, formularies, and patient populations. Our findings highlight the ongoing challenge of developing and fine-tuning the vocabulary of high value care and clarifying the role of the physician in these efforts across different healthcare settings. One approach would be to adopt the 2013 Millennium Conference consensus statement (a joint effort of the ACP and the Association of American Medical Colleges) on teaching high value care that recommended educators use a patient-centered approach.¹⁵ A patient-centered approach would help more consistently define the role of the individual provider as patient advocate. However, this would require that trainees attain superior communication skills and have adequate time to engage in shared decision making, particularly in situations when patients request unnecessary or low-value interventions (such as costly imaging for nonspecific low back pain or antibiotics for upper respiratory infections, for example).

This study has a number of limitations including social desirability (correct answer) bias and recall (memory) bias common to retrospective survey studies. Participants completed their

residency training as many as 10 years prior to being surveyed and their recall of the experiences may be positively or negatively biased by more recent events and experiences. Thus, reported experiences during residency may not represent actual training received. Furthermore, the duration of time since completion of training may have impacted the accuracy of survey responses. While we obtained a relatively high response rate for a physician survey and our respondents were similar to the non-respondents as well as early and late respondents,^{18,30} potential for response and selection bias remains. Furthermore, only 10% of respondents provided free text comments. Thus, common themes elicited from the comments should not be interpreted as representative of our sample or the views of physicians in general. Lastly, the RHVC scale has not been externally validated as a tool to measure residency high value care. Since we were unable to correlate the RHVC scale with an externally validated measure, there is some uncertainty regarding respondents' interpretation of survey questions and answer options, and the generalizability of the findings to other samples may be limited.

Conclusions

In a national survey, US internal medicine physicians who completed residency in the past decade reported mixed experiences with high value care during training. In particular, respondents reported a lack of awareness of costs of medical interventions during training and felt ill prepared to use consensus guidelines that aim to reduce the use of unnecessary tests or treatments at the completion of training. Poor alignment of systems with high value care was a commonly cited barrier among internal medicine residency graduates. Physicians who completed residency more recently reported overall more high value care training, which may reflect increased national and local efforts in this area. However, experiencing high value care as a trainee may not translate into specific tools for practice. Consistent with theory of workplace learning, our findings suggest that efforts aimed at achieving better alignment of systems of care with high value care principles and routine modelling of high value care delivery tools by attendings (such as conversations about costs with patients and application of overtreatment guidelines) may be effective in helping residents establish high value care practice patterns that persist in independent practice.

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Appendix B. Development of Residency High Value Care Scale

We used descriptive statistics to evaluate distributions of physician responses to survey items pertaining to residency experience related to high value care training. Missing responses ranged between 1.3–2.2% of observations. Items were examined for inclusion in the Residency High Value Care (RHVC) scale in an iterative process using inter-item and item-total correlations, Cronbach alpha coefficients, and factor analysis with varimax orthogonal rotation. Factor analysis considered 1, 2, 3, and 4 factor solutions.

The item “At the completion of my training, I felt prepared to manage interprofessional partners (e.g., NPs or PAs)” measured on a 4-point Likert scale of agreement was conceptually distinct from the other questions, which was reflected in low correlations with the other eight questions, and not well coherent with *a priori* objective (to evaluate physician perceptions of experiences related to high value care during residency). That item was not included in the RHVC scale. Principal components analysis supported a 1-factor solution (Cronbach alpha 0.84, rotated loadings 0.40–0.84). The rotated factor loadings for each of the 8 items in the final RHVC scale are shown below:

Question item #	Factor1	Uniqueness
10a	0.7861	0.3820
10b	0.6762	0.5428
10c	0.8405	0.2935
10d	0.6691	0.5523
10e	0.6306	0.6024
10f	0.3990	0.8408
11b	0.5347	0.7141
11c	0.4664	0.7825

Table 1

Characteristics of Participants (N=456)

	n (%)
Demographics	
Male	236 (51.8)
Age, mean (SD) (n=451)	40.3 (7.6)
Race	
Asian or Asian-American	124 (27.2)
Black or African-American	24 (5.3)
White or Caucasian	258 (56.6)
Other or Unknown	50 (11.0)
Ethnicity	
Hispanic/Latino	26 (5.7)
Residency program characteristics	
Residency region (n=444)	
South	110 (24.8)
Midwest	110 (24.8)
Northeast	166 (37.4)
West	58 (13.1)
Residency training program type *	
University-affiliated	313 (68.6)
Community	173 (37.9)
Primary care track	79 (17.3)
Research track	8 (1.8)
Other	10 (2.2)
Participated in a cost-containment project during training	24 (5.4)
Years since completing residency (n=451), mean (SD)	7.0 (3.0)
Characteristics of current practice	
Region of current practice	
South	160 (35.1)
Midwest	95 (20.8)
Northeast	108 (23.7)
West	93 (20.4)
Practice setting type (n=455)	
Solo practice	44 (9.7)
Group private practice	133 (29.2)
Group or staff model HMO	49 (10.8)
Academic faculty practice	60 (13.2)
Hospital-owned practice	136 (29.9)

	n (%)
VA facility	7 (1.5)
Community health center or public clinic	14 (3.1)
Other	12 (2.7)

* Categories are not mutually exclusive

HMO – Health Maintenance Organization, VA – Veterans Affairs

Table 2**Self-reported Experiences Related to High Value Care in Residency Training**

During your residency training...	Respondents who Answered “Frequently” or “Always”, n (%)				
	Overall	2003–2006	2007–2010	2011–2013	P-value
How often did your attending physicians discuss costs of care when taking care of patients? (n=450)	97 (21.6)	33 (21.0)	33 (18.2)	31 (27.7)	0.16
How often did your attending physicians question the necessity of a workup? (n=450)	214 (47.6)	69 (44.0)	82 (45.3)	63 (56.3)	0.10
How often were you exposed to teaching about cost conscious care? (n=450)	106 (23.6)	35 (22.3)	38 (21.0)	33 (29.5)	0.23
How often were you aware of costs of care for your patients? (n=448)	89 (19.9)	29 (18.5)	35 (19.4)	25 (22.5)	0.70
How often were you expected to justify tests that you ordered? (n=448)	209 (46.7)	65 (41.7)	89 (49.2)	55 (49.6)	0.30
How often did you prescribe generic medications when they were available? (n=450)	380 (84.4)	122 (77.7)	158 (87.3)	100 (89.3)	0.01 *
	Respondents who Answered “Strongly/Moderately Agree”, n (%)				
	Overall	2003–2005	2006–2009	2010–2013	P-value
At the completion of my training, I felt prepared to use overtreatment guidelines in my conversations with patients. (n=446)	193 (43.8)	59 (38.3)	71 (39.4)	63 (58.9)	0.01 *
At the completion of my training, I felt prepared to participate in shared decision making with patients. (n=447)	379 (85.8)	127 (81.9)	157 (87.2)	95 (88.8)	0.23

* p-value<0.05

Table 3

Factors Associated with Residency High Value Care Scale Score (N=431)

Characteristic	Coefficient	95% CI		P-value
Gender				
Female	Reference	-	-	-
Male	-0.10	-1.01	0.81	0.83
Years since completing residency	-0.34 *	-0.49	-0.18	0.01
Region of residency training				
South	Reference	-	-	-
Midwest	-1.03	-2.31	0.24	0.11
Northeast	-1.21 *	-2.38	-0.04	0.04
West	-0.28	-1.81	1.26	0.72
Training program type				
University-affiliated (vs. non-university affiliated)	0.93	-0.32	2.17	0.14
Community (vs. non-community)	0.75	-0.42	1.92	0.21
Primary care (vs. non-primary care)	2.22 *	1.01	3.43	0.01
Research (vs. non-research)	1.49	-1.91	4.88	0.39
Feeling burned out at the completion of training	-0.52 *	-1.00	-0.04	0.03

* p-value<0.05

Table 4

Themes Expressed by Respondents Regarding Training in High Value Care (N=47)

Theme	Subcategory	Example	Frequency
Alignment of systems during training with high value care	Poor alignment	"Since we had to transport and draw our own labs post am blood draw, you ordered everything anyone might want everyday to prevent having to draw blood."	15 (32%)
	Good alignment	"The majority of my clinic patients in residency were uninsured so generic medicine and things like the \$4 [drug] list were often utilized"	14 (30%)
Expressed interest in receiving more training in high value care	-	"Residency training should include talking to residents about cost-effective management especially generic vs. trade names, ordering unnecessary testing/imaging, unnecessary referrals to specialists when it could be handled by the PCP."	9 (19%)
Conflict regarding the beneficiary of cost-savings	Patient as beneficiary	"During my training at a large private hospital patients were discharged quickly ... but during my training at a VA hospital patients were routinely kept inpatient for outpatient workups. This was partly because it took months to see a specialist [as] outpatient in the VA but only weeks in the private sector."	7 (15%)
	Hospital or healthcare system as beneficiary	"It [training] had a lot of emphasis about reducing costs for the hospital alone."	2 (4%)
Malpractice litigation as a barrier to high value care	Health-system driven	"One thing I learned was insurance companies punish doctors for doing more. But lawyers, media, patients, patient advocates punish doctors for doing less. In the end, it is always easier for doctors to deal with insurance companies than lawyers. Most doctors went to medical schools <i>not</i> for money. So it is easier to lose money than reputation, respect, and licenses."	6 (13%)
	Attending-driven	"During residency training the attendings are more concerned with protecting themselves or the institution against legal problems so the cost effectiveness is not really practiced"	2 (4%)
Medical training as incompatible with high value care	Goals of training conflict with cost-containment	"Residency training is all about showing off how smart you are."	5 (11%)
	Patient-centered care precludes consideration of costs	"Guidelines not commandments. I was taught to think on my own for my patients."	3 (6%)