High-Value, Cost Conscious Care in Medical Education

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Scholarly Report submitted in partial fulfillment of the MD Degree at Harvard Medical School

Date: 31 January 2018

Student Name: Eileen R. Brandes, B.S.

Scholarly Report Title: High Value, Cost-Conscious Care in Medical Education

Mentor Name and Affiliation: Steven E. Weinberger, MD, MACP, FRCP. Executive Vice President and CEO Emeritus, American College of Physicians, Senior Lecturer on Medicine, Harvard Medical School

Collaborators, with Affiliations:
Arlene Weissman, PhD, Director, Research, American College of Physicians
Greta Bunin, PhD, Senior Research Analyst, American College of Physicians
Abstract

Title: High Value, Cost-Conscious Care in Medical Education

Purpose: Healthcare costs represent 18% of the GDP and are continuing to rise. A major contributor is healthcare waste, an important component of which is the overuse and misuse of diagnostic testing and treatment. A recent approach to this problem is the promotion of the concept of High Value Care (HVC), i.e. healthcare that provides the greatest benefit relative to cost and harm. Although effecting a culture change about HVC has become a major priority in medical education, it is currently unknown to what extent HVC has permeated the curriculum of medical school and the clinical experiences of medical students.

Methods: A web-based survey of 20 questions was developed to compare exposure and attitudes of medical students and residents to HVC. The survey was distributed to a random sample of 1000 second year medical students (M2), 1000 fourth year medical students (M4) and 500 PGY2 and 500 PGY3 internal medicine residents (PGY) who are members of the American College of Physicians.

Results: We received 479 completed questionnaires, yielding a 16% response rate, which included responses from students and residents attending or having graduated from 144 allopathic and osteopathic medical schools. Overall, 76% of respondents indicated that they had been introduced to the concept of HVC at some point during their education or training. This percentage increased over the course of training (61% of M2, 79% of M4 and 88% of PGY; p<0.05). However, only 29% of all respondents reported that they were either very or moderately familiar with HVC. At all stages of training, “fear of missing something” was felt to be the most important factor contributing to the administration of relevant but unnecessary tests, followed by “wanting to be as thorough as possible.” There was a significant decrease over the course of training in considering “fear of a negative evaluation for not being thorough” as a major driving factor in administering a relevant, yet unnecessary test (45% of M2, 31% of M4 and 23% of PGY) (p<0.05). Of those exposed to HVC, trainees with clinical clerkship experience (i.e. M4 and PGY) reported the highest likelihood of exposure to HVC during their Internal Medicine Clerkship (91% of M4, 65% of PGY) followed by Family Medicine/Primary Care (71% of M4, 38% of PGY); all other clerkships had 44% (M4) and 11% (PGY) exposure or less. All groups reported that “lack of information about the cost of a test or treatment” was the most significant barrier to learning about HVC.

Conclusions: Although HVC exposure increases during training, barriers remain to both learning about and practicing HVC. There is also a wide variation in exposure to HVC across different medical school clerkships.
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Glossary of Abbreviations

AAIM: Alliance for Academic Internal Medicine
ACGME: Accreditation Council for Graduate Medical Education
ACP: American College of Physicians
HVC: High Value Care
Section 1: Introduction

Background

While the United States is quite divided about the implementation of the Affordable Care Act, few will disagree with the statement that health care costs are rising at an unsustainable rate and placing incredible stress on the American economy (1,2). In 2016, the United States increased spending on healthcare by 4.3% from the previous year to $3.3 trillion ($10,348 per person), compared to just $253 billion in 1980 ($1,120 per person) (2,3). The ever-increasing cost of health care has become a major issue to address, and there has been discussion about avenues for direct financial approaches to decrease spending through budget cuts and lower payments. However, this strategy is concerning as it has the potential to compromise quality healthcare (4,5).

With 20-30% of healthcare expenditures (approximately $580-765 billion) being categorized as wasteful, a more promising answer may lie in eliminating health care waste (1,6,7). One aspect of waste that has become progressively worse is the overuse and misuse of diagnostic testing. As the development of new healthcare technology and available testing continues to grow, controlling their usage and cost needs to be more strongly addressed (6).

Within the past few years, the idea of High Value Care (HVC) care has emerged. This ideology is not measured solely by cost reduction, but by the ratio of outcomes (quality) to cost and risk – balancing the benefits of tests and treatments with both the cost and the potential for harm (5,8). Focusing efforts on the value of care provides health care professionals with a better metric for comparing different options for diagnosis or treatment than does considering cost alone. Beneficial forms of treatment without a comparable alternative sometimes appropriately merit a higher price (5). On the other hand, even a very inexpensive blood test, if not providing any benefit or utility in the patient’s care, cannot really be justified. While it may seem taboo to address cost in the discussion of one’s health, this issue cannot be overlooked. As physicians’ decisions account for 80% of healthcare spending, physicians represent a critical population within healthcare that can achieve significant results in cost reduction without compromising quality of care (7,9,10).

The reason that high value, cost-conscious care has not been strongly addressed until recently is multifactorial. First, healthcare professionals are focused on patient-centered care and advocating for each patient individually. Second, patients are becoming more informed about, and sometimes demanding of, health care services. Third, academia recognizes advancements in knowledge and ability with less concern for cost management. Finally, pressure to rapidly discharge patients from the hospital to improve inpatient bed availability leads to preemptive ordering and limits trainee exposure to decision-making and value-based conversations with patients (6).

As the importance of high value care continues to catch fire, its teaching has come to the forefront as a major issue in medical education (10). Training physicians, residents and medical students to practice HVC requires knowledge and skills that are developed with time, through repetition and with the guidance of qualified mentors. It has been shown at the resident level that
training impacts future practice (11). A transition in ideology away from “more is better” and formally incorporating HVC into medical education is required to effect this change (7).

The main focus of HVC education implementation has been in residency curricula. While it may seem most logical to begin this education when trainees have more skills and knowledge, practice habits are developed beginning on the first day of medical school and persist throughout a career (7). Thus, exposure to and education about HVC early in training are critical and would allow HVC to become the norm of the next generation. It is believed that a cultural change to recognize that more is not necessarily better takes time and formal training, and thus, needs to start at the medical student level.

Few comprehensive studies have been done to investigate the attitudes and experiences of both residents and medical students during their training. A few studies at individual residency programs have been conducted addressing the lack of, yet need for, HVC education in the curriculum (7, 12-15). HVC education has not been traditionally addressed at the undergraduate medical student level, though this has begun to change at a few individual institutions (16-20). However, exposure to and attitudes about HVC have not been systematically assessed. Thus, we sought to longitudinally investigate students’ knowledge of, exposure to, and attitudes toward HVC.

Section 2: Student Role

Eileen Brandes conducted the literature review, developed the survey questions, wrote the IRB for survey administration, conducted the statistical analysis, interpreted the results and wrote up the findings. This work was done under the guidance of Drs. Steven Weinberger, Arlene Weissman and Greta Bunin (see affiliations above). The survey was administered via the ACP.

Section 3: Methods

Survey Design

The online survey consisted of 20 questions and was intended to take approximately 10 minutes to complete (Appendix 1). All responses were anonymous. Students were asked about their exposure to, self-reported understanding of and attitudes towards High Value Care. Attitudes were assessed through five questions in which the respondent was asked to agree or disagree with 5 HVC statements on a 5-point Likert Scale (1, completely disagree; 2, somewhat disagree; 3, neutral; 4, somewhat agree; 5, completely agree). For each question, the response was converted to a number from 1 to 5 representing its “HVC-centeredness,” taking into account whether a high or low number for each question represented an HVC-centered response. The higher the score, the more HVC-centered the attitude (maximum total score = 25; minimum total score = 5).

In order to assess potential barriers to practicing HVC, we asked students and residents to assess how much each of six different factors affected whether they would administer a relevant, yet unnecessary test (major factor, minor factor, not at all). We next assessed trainees’ exposure to HVC in various graduate and undergraduate medical settings through four questions, including
whether they had been exposed, and if so, how often and in which settings and/or courses. We next asked how much of a barrier six different factors were to learning HVC for all students and residents at their current level of training. Finally, we surveyed the extent to which students and residents felt there was a need to include HVC training within the educational curriculum.

Three demographic questions were included, asking whether there was an immediate family member in the health care profession, current training level and sex of the respondent.

Survey Sample

From approximately 32,000 medical students and 22,000 internal medicine residents who are members of the American College of Physicians, we randomly selected 3,000 U.S. medical students and residents at three different training levels: second year medical students (M2; n=1,000), fourth year medical students (M4; n=1,000) and postgraduate year two or three internal medicine residents (PGY; n=1,000, comprising PGY2 n=500, PGY3 n=500). We selected 1,000 for each category in order to have sufficient statistical power. We chose these three levels of training because they represent three different benchmarks in medical education. Second year medical students will have had training predominantly in the didactic setting. Fourth year students will have had training predominantly in the didactic setting as well as at least one year in the clinical setting. Second and third year residents will have completed at least one year of graduate medical education, giving them more clinical experience and a larger role in patient care. We chose to survey current members of the American College of Physicians (ACP) as it provides a very large database of medical students and residents nationwide. We excluded medical school students and residents who are in medical school or training programs outside of the United States. We obtained institutional review board (IRB) approval from the Human Subjects IRB at Harvard Medical School to conduct the survey.

Survey Administration

The survey was administered online between July and August 2015. Three reminder emails were sent on days 7, 14 and 21 to all non-respondents (with day 1 being when the survey was first sent). Sampled students and residents were sent a recruitment email with a link to the survey provided in the email. As an incentive to respond, respondents were entered into a raffle to win either ACP’s “Teaching In Medicine” Series for residents or access to “IM Essentials Online” for medical students. Of the 3,000 members surveyed, 649 responded. 37 were excluded due to their being at the incorrect training level. 133 were eliminated due to partial completion. This yielded a raw completion rate of 479 surveys (M2 - 216, M4 - 121, PGY - 142), yielding a response rate of 16%. 144 different allopathic or osteopathic medical schools were represented in this response rate. 54% of respondents were female. 36% of respondents indicated they had an immediate family member in medicine.

Statistical Analysis

Relationships were analyzed in SPSS using chi-squared and ANOVA tests, as appropriate.

Role of the Funding Source
This study was funded by matching grants from the Scholars in Medicine Office at Harvard Medical School and the American College of Physicians.

Section 4: Results

Exposure and Familiarity to HVC (Table 1)

The majority of respondents reported that they had been exposed to HVC: 61% of M2, 79% of M4, and 86% of PGY (Table 1). The likelihood of being exposed to HVC was associated with level of training (p<0.05). Despite having been exposed to HVC, the majority medical student respondents self-reported that they were either “slightly” or “not at all” familiar with the concept of HVC (87% of M2, 76% of M4), with “very” and moderately” familiar being options as well. Familiarity increased with one’s level of training (p<0.05).

The majority of respondents selected the correct definition of High Value Care amongst four options (79% of M2, 80% of M4, 86% of PGY). Correctly answering the question defining HVC was not associated with one’s level of training or familiarity with HVC (p>0.05).

HVC Attitudinal Score

The overall HVC attitudinal score reflecting the respondent’s attitude about the physician’s responsibility to provide high value care was 18.57 for M2, 19.5 for M4 and 19.6 for PGY out of a possible 25 points. There was a statistically significant difference between the scores for M2 compared with both M4 and PGY (p<0.05). There was no difference between the scores for M4 and PGY (p>0.05).

The highest mean (of all trainee levels) for an individual question was: “Physicians should be responsible for trying to contain costs.” In response to this question, there was no difference amongst the three groups (p>0.05). The lowest mean for an individual question was: (1) “Physicians should order tests that might provide additional clinical information, even if those tests are unlikely to alter patient management” and (2) “Physicians should do more testing rather than less in order to be as thorough as possible.” In response to question (1), there was a statistical difference between M2 and M4 (M2=3.59, M4=3.93, p<0.05). In response to the question (2), there was a statistical difference between M2 and M4/PGY (M2=3.38, M4=3.88, PGY =4.13, p<0.05). The HVC attitudinal score was higher in respondents who were very or moderately familiar with the concept versus slightly or not familiar (very familiar: 20.43, moderately familiar: 19.87, slightly familiar: 18.94, not familiar: 18.56; p<0.05).

The question with the greatest difference amongst groups was: “Physicians should do more testing rather than less in order to be as thorough as possible” (3.38 for M2, 3.88 for M4, 4.18 for PGY; p<0.05 for M2 compared with M4 and PGY). There was no statistical difference amongst the groups for the other three questions: (a) “Physicians should be responsible for trying to contain costs” (3.85 for M2, 4.01 for M4, 4.04 for PGY; p>0.05); (b) “Physicians should order all potential tests at once as it expedites diagnosis and patient care” (3.83 for M2, 3.88 for M4, 3.83 for PGY; p>0.05); (c) “Physicians should consider the total cost of care (to patients and
insurance companies) when choosing a course of action” (3.92 for M2, 3.80 for M4, 3.83 for PGY; p>0.05).

**Driving forces for administering relevant, yet unnecessary tests** (Figure 1)

In response to questioning about potential driving forces for students and residents to order relevant, yet unnecessary, tests, respondents most commonly cited as a major factor “fear of missing something” and “wanting to be as thorough as possible.” For both of these driving forces, the percentage that identified these issues as a “major factor” decreased as level of training increased, which was statistically significant (p<0.05). For all six of the options addressed, there was a trend in the percentage of “major factor” responses, with M2 responding with the highest percentage of “major factor.” “Fear of a negative evaluation” was more frequently cited as “not a factor” by PGY (39%), than by M2 (9.7%) and M4 (14%) (p<0.05).

**Barriers to learning** (Figure 2)

The most commonly reported barrier to learning about HVC was “lack of information about the cost of a test or treatment,” which was cited as a “major barrier” by 58% of M2, 70% of M4 and 75% of PGY. The potential barrier that was least often identified as a factor was the philosophy that “more care equals better care.”

After “lack of information about the cost of a test and treatment,” the options with the second largest percentage of “major barrier” response varied by the category of respondent. For both M2 and M4, the second most frequent “major barrier” response was “not understanding both the benefits and harms of individual tests” (40% and 25%, respectively). For PGY, “variation in faculty/mentor practice of HVC” was the second most frequently reported “major barrier” (41%) while only 17% indicated that it was “not a barrier”.

Additional barriers that were not included in the survey list, but were noted by students and residents in the free text “Other” response option:
- **Second Years**: faculty not fully understanding what “value-based healthcare” is; lack of policy/insurance/non-diagnostic and treatment related discussions; already an overwhelming amount of information to learn
- **Fourth Years**: high workload/paperwork; ambiguity around cost; physicians have a financial stake in which tests are ordered; uninsured patients who may not frequent the healthcare system enough (take advantage of them being in the hospital or clinic); lack of opportunities to discuss HVC outside of being given guidelines
- **Residents**: labs/tests for “teaching purposes”; demand for faster discharges; don’t feel they have the legal support to practice HVC

**Need for a curriculum change** (Figure 3)

Overall, 83% of respondents felt there was a moderate or great need for improvement. Only 1% felt that there was no need for a curriculum and 2.5% were unsure.

**Settings for exposure to HVC**
In didactic settings, medical students were most exposed to HVC in lectures or case-based discussions (Figure 4). PGY’s were most exposed during lectures and teaching conferences (63% and 56%, respectively). In patient care settings, most M4 and PGY heard or learned about HVC during discussions on work or teaching rounds (71% and 77%, respectively) (Figure 5). A majority of PGY had exposure by “role modeling” and “expectations of supervising physicians” (57% and 54%, respectively).

The majority of medical students had never used an online resource related to HVC, (90% of M2, 84% of M4). In contrast, the majority of PGY have used “Choosing Wisely” lists published by the ABIM Foundation (53%) (Figure 6).

**Exposure to HVC during Medical School Courses, Clerkships and Residency Rotations**

When asked about which medical school courses, if any, provided exposure to HVC, the largest number of respondents mentioned their preclinical clerkship/patient-doctor course, followed by their ethics course. 44% of total respondents had not been exposed to HVC during their medical school courses (Figure 7). Of those exposed to HVC at some point during their training, 44% of PGY indicated they were never exposed to HVC during their preclinical years, whereas only 6.1% of M2 and 22% of M4 had not been exposed during those years (Figure 8).

During their medical school clerkships, of those indicating exposure to HVC, the majority of respondents in the clinical settings (M4 and PGY) were exposed to HVC on their internal medicine clerkship followed by their family medicine/primary care rotation. Within both of these clerkships, M4 had been exposed to HVC far more than PGY (internal medicine: 91% for M4 vs. 65% for PGY; family medicine/primary care: 71% for M4 vs. 38% for PGY). 31% of PGY had not been exposed to HVC during their clerkships whereas only 2.1% of M4 had not been exposed (Figure 9).

During residency rotations, the largest exposure for PGY was during their inpatient general medicine and outpatient rotations (89% for each). Only 2.5% of PGY had not been exposed to HVC during their residency training (Figure 10).

**Section 5: Discussion, Limitations, Conclusions and Suggestions for Future Work**

*Discussion*

This study shows that while medical students and residents are being increasingly exposed to and taught HVC, there are still challenges to assuring the dissemination of these concepts and to changing the culture of the training environment. These issues include inadequate training within this exposure, variations in the settings where exposure occurs and significant barriers to learning.

In this study, while the majority of students and residents understood the definition of HVC when given a list of choices, most indicated that they were only “slightly” or “not at all familiar” with the concept. This likely speaks to “High Value Care” being a self-explanatory term in
general, especially at the early training level, since the likelihood of having been exposed and exposure frequency to HVC increased with training level, which was statistically significant.

When assessing the limitations to learning and practicing HVC, the top two factors contributing to the administration of relevant, yet unnecessary tests were the “fear of missing something” and “wanting to be as thorough as possible.” These responses likely stem from the practice of “defensive medicine” and the concern about litigation involved in medical practice. It becomes easier to spend more when costs are not transparent as well as when they are thought to be covered by insurance. It becomes easier to spend more when there are no real penalties for overspending, yet when there are perceived penalties for insufficient workups.

The greatest barrier to learning HVC was the “lack of information about the cost of a test or treatment.” Based on our findings, the recognition of any factor being a barrier decreases as one progresses through training, indicating either greater confidence or improved exposure to and education about HVC.

When analyzing the settings where HVC occurs, there is notable variation amongst third year medical school clerkships. While 33% of respondents had no exposure to HVC during their clinical year, of those that were exposed during training, there was a notable skew during different clerkships, with the highest levels being seen in Internal Medicine (91% for M4, 65% for PGY) and Family Medicine/Primary Care (71% for M4 vs. 38% for PGY). All other clerkships were associated with 44% (M4) and 11% (PGY) exposure or less. There are many factors that could be contributing to this finding, such as differences in faculty familiarity and acceptance of the concept, didactic time, face time with attendings or length of the rotation. However, internal medicine has so far proven to be the most progressive residency regarding the implementation of a HVC curriculum and a focus on overused diagnostic testing, which likely also extends to exposure of medical students throughout their internal medicine clerkship. This is supported by the fact that just over 60% of PGY in internal medicine have been exposed to “Choosing Wisely” Lists (evidence based lists providing information on certain tests and procedures) and just over 25% have been exposed to the HVC curriculum developed by ACP and AAIM (Alliance for Academic Internal Medicine).

It appears that exposure to HVC is increasing over time at the medical student level given that a much higher percentage of current medical students indicated exposure to HVC versus residents reflecting back on their undergraduate medical education. While this could be secondary to recall bias, it could also reflect the greater emphasis on HVC in practice today than even seven years ago. ACP’s High Value, Cost-Conscious Care initiative was introduced in 2010, followed shortly after by the ABIM Foundation’s “Choosing Wisely” campaign; these efforts were likely important factors in driving this change. A critical additional factor contributing to an increase in residency exposure and familiarity with HVC has been the institution of an Accreditation Council for Graduate Medical Education (ACGME) “milestone” (Milestone #10) relating to HVC by which internal medicine residents are now being evaluated during training (21).

We also recognize that exposure to, understanding of and practice of HVC are different entities. While many students are being exposed to HVC during patient care and in didactic settings, it is
not currently clear how formal this training is and how efficacious these exposures are as there is no real assessment of this competency at the medical student level, unlike the residency level.

For all the reasons above, the development of both formal and informal curricula and role modeling of high value, cost-conscious care are important. Assuring that clinical decisions take value into account is critical to the sustainability and durability of our healthcare system. Internal medicine residency programs have been directed to address this idea as an important ACGME milestone during training. It is apparent through this survey that undergraduate medical institutions have begun to embrace this priority as well, albeit informally and irregularly throughout the curriculum. Ultimately, the fact that 83% of respondents feel there is a moderate or great need for further education and experiences designed to increase the knowledge and skills of future physicians in balancing the benefits of diagnostic tests and treatments with the relevant harms and costs is a testament to the need for improvement within this realm.

**Limitations**

The response rate for this survey was 16%, which is much less than we had hoped for or anticipated. For this reason, we can question the reliability and validity of the study and ask whether the responses to the survey were representative of what we would have found if we had achieved the desired response rate of 50%. Additionally, the residency data are limited to internal medicine residents and do not look at other specialties. Therefore, these results can only be generalized to internal medicine residents and medical students registered with the ACP. Regarding the survey questions, answers to knowledge questions about HVC do not necessarily predict HVC behavior in the actual clinical setting.

Inherent to surveys in general, there is the possibility for differences in question interpretation, confounding whether questions are evoking reproducible and consistent answers from respondents. We attempted to control for this by conducting a pre-test to ensure questions were specific and clear. Second, although we specifically designed the survey questions to minimize leading respondents to a desired response, social desirability bias could lead to over-reporting of favorable attitudes and under-reporting of poor HVC practice. Finally, there is concern for recall bias given the breadth of information one is exposed to and the length of medical training.

Despite the low response rate measured by the percentage of students who responded, the fact that responses were obtained about experiences in 144 different allopathic and osteopathic medical schools indicates that we were able to obtain information relating to HVC education at an overwhelming majority of American medical schools.

**Conclusions**

The goal of this study was to conduct an overarching investigation to inquire whether and how medical students are being educated about HVC. Our survey results show that although HVC exposure increases during training, barriers remain to both learning about and practicing HVC and there is a large variation in what settings trainees are being exposed. Efforts to broaden the exposure of medical students and residents to the concept and practice of high value care should continue. This should be accompanied by addressing barriers to the effective education and
practice of HVC. Ultimately, it is important to effect change in the culture of medical schools and academic medical centers so that all medical students, residents and practicing clinicians are competent in and actually provide HVC.

Suggestions for Future Work

1. Investigate what is being developed within other residency programs outside of internal medicine.
2. Given the low response rate, develop a better method for collecting data about HVC education to either validate or refute the findings of this study.
3. Assess whether current attendings feel they are practicing/teaching HVC with their students and residents and/or if they feel they should be.
4. Investigate how residency programs are implementing and assessing HVC within their curricula.
5. If a HVC curriculum is introduced at the medical student level, longitudinally assess the impact of this curriculum.

Section 6: Acknowledgements

This study was supported by matching grants from the Scholars in Medicine Office at Harvard Medical School and the American College of Physicians. The content of this paper as well as the views and discussions are solely those of the authors and don’t necessarily represent the views of any partner organizations.

I would like to thank my mentor, Dr. Steven Weinberger, for his guidance on the development and writing of this project. I would also like to thank Drs. Arlene Weissman and Greta Bunin for their contributions to the survey design, administration and statistical analysis of the data.
References


Tables and Figures:

Tables:

Table 1:

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<th>2\textsuperscript{nd} Year Medical Students</th>
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<td>Total Respondents</td>
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<td>121 (25.3%)</td>
<td>142 (29.6%)</td>
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<td>Understands definition of HVC</td>
<td>170 (78.7%)</td>
<td>97 (80.2%)</td>
<td>122 (85.9%)</td>
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<td>Familiarity with HVC</td>
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<td>Slightly/Not: 187 (86.6%)</td>
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<td>95 (78.5%)</td>
<td>122 (85.9%)</td>
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Figures:
Figure 1:

Driving Forces in Administering a Relevant, yet Unnecessary, Test

- Patient Pressure
- Cost of the test
- Wanting to be as thorough as possible
- Fear of missing something
- Whether or not the test is covered by insurance
- Fear of a negative evaluation for not being thorough

Percentage of Respondents

Factors

M2 (n=216) M4 (n=121) PGY (n=142) Total (n=479)
Figure 2:

Barriers to HVC Education

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<td>Major</td>
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</tbody>
</table>

M2 (n=216) M4 (n=121) PGY (n=142) Total (n=479)
Figure 3:

Do you feel there is a need for a curriculum designed to increase HVC knowledge and skills?

Percentage of Respondents

<table>
<thead>
<tr>
<th>Response</th>
<th>2nd Years (n=216)</th>
<th>4th Years (n=121)</th>
<th>PGY's (n=142)</th>
</tr>
</thead>
<tbody>
<tr>
<td>To a great extent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To a moderate extent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>To a small extent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Unsure</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 4:

HVC Teaching in Didactic Settings

Percentage of Respondents

<table>
<thead>
<tr>
<th>Didactic Setting</th>
<th>M2 (n=216)</th>
<th>M4 (n=121)</th>
<th>PGY (n=142)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case-based discussion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grand Rounds</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Teaching Conferences</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reading Assignments</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>None</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Figure 5:

**HVC Teaching in Patient Care Settings**

![Bar chart showing percentage of respondents for different teaching methods in patient care settings.]

- Role Modeling: 80%
- Expectations of supervising physicians: 60%
- Discussions on work or teaching rounds: 80%
- Shadowing Attending Physicians: 40%
- None: 20%

Legend:
- M4 (n=121)
- PGY (n=142)

Figure 6:

**Use of HVC Resources**

![Bar chart showing percentage of respondents using different HVC resources.]

- Med U HVC Cases: 0%
- HVC curriculum developed by ACP and AAIM: 20%
- "Choosing Wisely" lists: 60%
- None: 20%

Legend:
- M2 (n=216)
- M4 (n=121)
- PGY (n=142)
Figure 7:

Settings of HVC Exposure

- Emergency Department
- Critical Care Unit
- Subspecialty/Electives
- Outpatient
- Inpatient (other than critical care unit)
- Radiology
- Psychiatry
- Geriatrics
- Neurology
- Surgery
- Emergency Medicine
- OB/GYN
- Pediatrics
- None
- Family Medicine/Primary Care
- Medicine
- Physiology
- Microbiology
- Pathophysiology
- Genetics
- Pharmacology
- Epidemiology
- Health Policy
- Ethics
- Preclinical Clerkship (Patient-Doctor)
- None

Percentage of Respondents
Figure 8:

HVC Exposure during Medical School Courses

Percentage of Respondents

Medical School Courses

- 2nd Years (n=132)
- 4th Years (n=95)
- PGY's (n=122)

PCC = Primary Care Clerkship

Figure 9:

HVC Exposure during Medical School Clerkships

Percentage of Respondents

Medical School Clerkships

- 4th Years (n=95)
- PGY's (n=122)

FM = Family Medicine
PC = Primary Care

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Figure 10: HVC Exposure during Residency Rotations

Residency Rotations

Percentage of Respondents

- Inpatient general medicine
- Outpatient
- Critical Care Unit
- Emergency Department
- Subspecialty services/electives
- Other
- None

PGY's (n=122)
Appendix:

Appendix 1 – Medical Student/Residency Survey

1. Which of the following best describes you?
   A. Medical Student
   B. Resident in training
   C. Other (*Terminate)

In the following question, (2a) should be for those who select “medical student” in question 1. (2b) should be for those who select “resident in training” in question 1.

2. 2a. As of July 1, 2015, which of the following best describes you?
   A. 1st year medical student (*These are terminated)
   B. 2nd year medical student
   C. 3rd year medical student (*These are terminated)
   D. 4th year medical student

2b. As of July 1, 2015, which of the following best describes you?
   A. PGY1 (*These are terminated)
   B. PGY2
   C. PGY3

3. A concept that is emerging in medicine is known as High Value Care (HVC). How familiar are you with the concept of HVC?
   A. Very familiar
   B. Moderately familiar
   C. Slightly familiar
   D. Not at all familiar

4. Whether or not you are familiar with the concept of High Value Care, which statement below best describes what this phrase conveys to you? (Choose One)
   A. Selecting the management option that costs the least for the patient
   B. Selecting the management option that costs the least for the entity that is primarily covering payment (e.g. Medicare, private insurance)
   C. Selecting the management option with the greatest benefit relative to cost and harm
   D. Selecting the management option that delivers the most benefit to the patient

5. Rate the extent to which you agree or disagree with each of the following statements.
   a) Physicians should order tests that might provide additional clinical information, even if those tests are unlikely to alter patient management.
1) Completely Agree  
2) Somewhat Agree  
3) Neutral  
4) Somewhat Disagree  
5) Completely Disagree (5 points)

b) Physicians should do more testing rather than less in order to be as thorough as possible.  
1) Completely Agree  
2) Somewhat Agree  
3) Neutral  
4) Somewhat Disagree  
5) Completely Disagree (5 points)

c) Physicians should be responsible for trying to contain costs.  
1) Completely Agree (5 points)  
2) Somewhat Agree  
3) Neutral  
4) Somewhat Disagree  
5) Completely Disagree

d) Physicians should order all potential tests at once as it expedites diagnosis and patient care.  
1) Completely Agree  
2) Somewhat Agree  
3) Neutral  
4) Somewhat Disagree  
5) Completely Disagree (5 points)

e) Physicians should consider the total cost of care (to patients and insurance companies) when choosing a course of action.  
1) Completely Agree (5 points)  
2) Somewhat Agree  
3) Neutral  
4) Somewhat Disagree  
5) Completely Disagree

6. **Think about where you are in your training today. If you were to see a patient tomorrow, how much of a factor would each of the following be in influencing your decision to administer a relevant, yet unnecessary test?**

   a) Patient pressure  
   1) Major Factor  
   2) Minor Factor  
   3) Not At All
b) Cost of the test
   1) Major Factor
   2) Minor Factor
   3) Not At All

c) Wanting to be as thorough as possible
   1) Major Factor
   2) Minor Factor
   3) Not At All

d) Fear of missing something
   1) Major Factor
   2) Minor Factor
   3) Not At All

e) Whether or not the test is covered by insurance
   1) Major Factor
   2) Minor Factor
   3) Not At All

f) Fear of negative evaluations for not being thorough
   1) Major Factor
   2) Minor Factor
   3) Not At All

7. **High Value Care** means choosing those diagnostic evaluations and treatments that provide the greatest benefit for the patient relative to costs and potential harms. Based on this definition, have you been introduced to the concept of High Value Care at any time during your education or training?

   A. Yes
   B. No (*Have the survey skip to question 15)
   C. Unsure (*Have the survey skip to question 15)

8. How often did the concept of High Value Care come up in discussion?
   A. Seldom (e.g., only a few times, only a single course or setting)
   B. Sometimes (e.g., more than one course or setting)
   C. Often (e.g., commonly incorporated in teaching and discussions)

9. In which of the following patient care settings has the concept of High Value Care been presented and/or taught to you? Please select all that apply:
   - Role modeling
   - Expectations of supervising physicians
Discussions on work rounds or teaching rounds
- Shadowing attending physicians
- None
- Other (Please Specify: __________)

10. In which of the following didactic settings has the concept of High Value Care been presented and/or taught to you? Please select all that apply:
- Lectures
- Cased-based discussions
- Grand Rounds
- Teaching conferences
- Reading assignments
- None
- Other (Please Specify: __________)

11. To which of the following resources relating to High Value Care, if any, have you been exposed? Please select all that apply:
- MedU High Value Care course
- High Value Care Curriculum developed by the American College of Physicians (ACP) and the Alliance for Academic Internal Medicine (AAIM)
- “Choosing Wisely” lists of overused/misused tests or treatments
- None of the above

12. In which of the following medical school courses, if any, did you hear and/or learn about High Value Care? Please select all that apply:
- Epidemiology
- Ethics
- Genetics
- Health Policy
- Human Systems/Pathophysiology
- Microbiology
- Pharmacology
- Physiology
- Preclinical Clerkship/Patient-Doctor
- None
- Other (Please Specify: __________)
13. (*This question is for 4th Year Medical Students and Residents only) In which of the following medical school clerkships, if any, did you hear and/or learn about High Value Care? Please select all that apply:

- Geriatrics
- Medicine
- Surgery
- Pediatrics
- Obstetrics/Gynecology
- Psychiatry
- Neurology
- Family Medicine/Primary Care
- Emergency Medicine
- Radiology
- None
- Other (Please Specify: ________________)

14. (*This question is for Residents only) In which of the following residency rotations, if any, did you hear and/or learn about High Value Care? Please select all that apply:

- Inpatient general medicine service (other than critical care unit)
- Outpatient
- Critical care unit
- Emergency department
- Subspecialty services/electives
- None
- Other (Please Specify: ________________)

15. At your current stage of training, how much of a barrier is each of the following in your learning about High Value Care (HVC)?

- Variation in faculty/mentor practice of HVC
  - Major Barrier
  - Minor Barrier
  - Not a Barrier
  - Not Sure

- Lack of information about the cost of a test or treatment
  - Major Barrier
  - Minor Barrier
  - Not a Barrier
  - Not Sure
c) Not understanding both the benefits and harms of individual tests
   1) Major Barrier
   2) Minor Barrier
   3) Not a Barrier
   4) Not Sure

d) The belief that more care equals better care
   1) Major Barrier
   2) Minor Barrier
   3) Not a Barrier
   4) Not Sure

e) The belief that doing everything right away is most efficient
   1) Major Barrier
   2) Minor Barrier
   3) Not a Barrier
   4) Not Sure

f) Faculty/attending does not have the time to address the topic
   1) Major Barrier
   2) Minor Barrier
   3) Not a Barrier
   4) Not sure

g) What, if any, other barriers exist in your training? Please specify: _______________

16. To what extent do you feel there is a need for a curriculum designed to increase the knowledge and skills of future physicians in balancing the benefits of diagnostic evaluation or treatment with the relevant harms and cost?
   A. To a great extent
   B. To a moderate extent
   C. To a small extent
   D. Not at all
   E. Not sure

17. Do you have an immediate family member (parent or sibling) who works in health care?
   o Yes
   o No

18. Are you male or female?
   o Male
- Female
- Prefer to not answer