Role Modeling and Regional Health Care Intensity: U.S. Medical Student Attitudes Toward and Experiences With Cost-Conscious Care

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Abstract

Purpose

To examine medical student attitudes toward cost-conscious care and whether regional health care intensity is associated with reported exposure to physician role-modeling behaviors related to cost-conscious care.

Method

Students at 10 U.S. medical schools were surveyed in 2015. Thirty-five items assessed attitudes toward, perceived barriers to, and consequences of, and observed physician role-modeling behaviors related to cost-conscious care (using scales for cost-conscious and potentially wasteful behaviors; Cronbach alphas of 0.82 and 0.81, respectively).

Results

Regional health care intensity was measured using Dartmouth Atlas End-Of-Life Chronic Illness Care data: ratio of physician visits per decedent compared with the U.S. average, ratio of specialty to primary care physician visits per decedent, and hospital care intensity index.

Conclusions

Medical students endorse barriers to cost-conscious care and encounter conflicting role-modeling behaviors, which are related to regional health care intensity. Enhancing role modeling in the learning environment may help prepare future physicians to address health care costs.
Medicine; University of California, Davis School of Medicine; Indiana University School of Medicine; Mayo Medical School; University of Michigan Medical School; Oregon Health & Science University School of Medicine; Pennsylvania State University College of Medicine; and Vanderbilt University School of Medicine. These schools are recipients of an American Medical Association (AMA) Accelerating Change in Medical Education grant and have variable class sizes, geographic locations, private/public status, and missions. All students were invited to participate because most contemporary medical school curricula (including the curricula at all participating schools) incorporate clinical experiences beginning in the first year. The institutional review board (IRB) at each school approved or exempted this study.

Survey instrument
Survey items measured student attitudes toward cost-conscious care (n = 13), perceived barriers to and consequences of cost-conscious care (n = 9), and reported exposure to physician role-modeling behaviors related to cost-conscious care (n = 13). Survey items were pilot-tested with medical students and modified on the basis of their feedback. (The survey instrument is available as Supplemental Digital Appendix 1 at http://links.lww.com/ACADMED/A357.)

Items assessing student attitudes toward cost-conscious care were derived from previously published surveys of practicing physicians and the AMA Council on Ethical and Judicial Affairs report on physician stewardship of health care resources. Items assessing perceived barriers to and consequences of cost-conscious care were derived from published surveys of practicing physicians and a review of the literature. For these items, students were asked to indicate their extent of agreement using a four-point Likert scale (1 = strongly disagree, 2 = moderately disagree, 3 = moderately agree, 4 = strongly agree), consistent with previous surveys of physicians.

Items assessing student exposure to physician role-modeling behaviors related to cost-conscious care were developed by the investigators on the basis of the literature. We classified these role-modeling behaviors a priori as cost-conscious (seven items) if they generally promoted less intense use of health care resources and as potentially wasteful (six items) if they generally promoted more intense use of health care resources. Students were asked to use a four-point scale to indicate how often in the past year they had observed a physician performing each behavior (0 = never, 1 = rarely [1–2 times], 2 = sometimes [3–5 times], 3 = often [6 or more times]).

Data collection
We e-mailed a letter to students between January and March 2015, inviting them to participate in the study. The letter indicated that participation was voluntary and that responses would be anonymous, and it included a link to the electronic survey, which was distributed using the Qualtrics survey platform. Up to three e-mailed reminders were sent to nonresponders. Informed consent was implied upon survey completion. Students at nine of the participating medical schools were given an opportunity to enter a lottery to win a $250 cash card as an incentive for participation. The IRB at one school did not allow an incentive.

Regional health care intensity
We measured regional health care intensity (the number and types of services patient receive) using hospital referral region (HRR)-level per capita data from the Dartmouth Atlas of Health Care's End-of-Life Chronic Illness Care database. These data reflect care intensity among Medicare beneficiaries in the United States, the ratio of medical specialty to primary care physician visits per decedent, and the hospital care intensity index (a composite measure of hospital days and inpatient physician visits)—all adjusted for age, sex, race, and chronic condition. We selected these measures of health care intensity on the basis of the premise that they would be more visible to students than direct measures of spending and because health care resource utilization among Medicare beneficiaries has been shown to reflect health care intensity among commercially insured patients and Medicaid beneficiaries in the same region.

Data analysis
Response rates were reported using the American Association for Public Opinion Research response rate 2 definition. The age, sex, and year in school of respondents were compared with those of the total sampled population. Descriptive summary statistics were reported as means with standard deviations (SDs) or frequencies with percentages, as appropriate. Differences among proportions were evaluated using the Pearson χ² test. To summarize student exposure to role-modeling behaviors, we created two role-modeling scales: one for cost-conscious role-modeling behaviors (from the relevant seven items, with possible scores ranging from 0 to 21) and one for potentially wasteful behaviors (from the relevant six items, with possible scores ranging from 0 to 18). These scales had raw Cronbach alphas of 0.82 and 0.81, respectively, indicating good internal consistency reliability. We calculated scores on each scale by summing students' responses to items on the scale, including only responses from students who had answered all items within a given scale. Scores on these scales were then used as dependent variables in unadjusted and adjusted (controlling for sex and year in school) linear regression models examining associations with regional health care intensity.

All tests were two sided, and P values < .05 were considered statistically significant. No imputations were
done for missing data. We conducted sensitivity analyses excluding responses from students who were not offered an incentive for participation. The false discovery rate approach was used to correct for multiple comparisons. Analyses were performed using SAS version 9.3 (SAS Institute, Cary, North Carolina).

Results
Of the 5,992 medical students invited to participate, 3,395 (57%) responded. Response rates at the 10 participating schools ranged from 40% to 75% (median 58%). The distributions of respondents with respect to sex, age, and year of training were similar to those of the overall sample (Table 1) and U.S. medical students in general.34

Attitudes toward cost-conscious care
While only 63% (1,867/2,955) of students agreed (moderately or strongly) that physicians should provide tests or treatments they recommend (2,920/3,006; 97%). Most also agreed that costs to society should be important in physician decisions (2,062/2,951; 70%) and that managing health care resources for all patients is compatible with physicians’ obligation to serve individual patients (2,343/2,926; 80%).

First- and second-year students were significantly more likely than third- and fourth-year students to agree that the cost of a test or medication is only important if the patient has to pay for it out of pocket (233/1,427 [16%] vs. 149/1,421 [10%], \( P < .001 \)); that it is unfair to ask physicians to be cost-conscious and still keep the welfare of their patients foremost in their minds (461/1,425 [32%] vs. 388/1,421 [27%], \( P = .008 \)); that physicians should talk to patients about the costs of care when discussing treatment options (1,353/1,433 [94%] vs. 1,242/1,422 [87%], \( P < .001 \)); and that physicians should provide tests or treatments if a patient requests them (411/1,432 [29%] vs. 163/1,424 [11%], \( P < .001 \); see Supplemental Digital Appendix 2 at http://links.lww.com/ACADMED/A358).

Perceived barriers to and consequences of cost-conscious care
Nearly all students agreed (moderately or strongly) that eliminating unnecessary tests or treatments they recommend (2,920/3,006; 97%). Most also agreed that costs to society should be important in physician decisions (2,062/2,951; 70%) and that managing health care resources for all patients is compatible with physicians’ obligation to serve individual patients (2,343/2,926; 80%).

| Table 1 |
|-----------------|-----------------|
| Characteristics | Respondents* (n = 3,395) | Overall sample (N = 5,992) |
| Male sex, no. (%) | 1,428 (49) | 3,049 (51) |
| Age, no. (%) | 2,663 (50) | 3,886 (62) |
| < 25 | 214 (7) | 461 (8) |
| 25–30 | 213 (2) | 78 (1) |
| > 40 | 32 (1) |
| Year of medical school, no. (%) | 2,577 (88%) | 2,935 (92%) |
| Year 1 | 722 (24) | 1,454 (24) |
| Year 2 | 731 (25) | 1,432 (24) |
| Year 3 | 666 (23) | 1,452 (24) |
| Year 4 | 765 (26) | 1,441 (24) |
| Other | 68 (2) | 213 (4) |

*Numbers in each column may not sum to the total for that column because of missing data. Data for the overall sample were obtained from institutional records.

Percentage calculations are not all based on a denominator of 3,395 because of missing responses to some survey items.
Most students also reported observing potentially wasteful role-modeling behaviors at least once in the last year, such as a physician ordering numerous tests all at once rather than waiting to see the results of initial screening tests (2,339/3,136; 75%) or repeating tests rather than attempting to obtain recently performed test results (2,249/3,134; 72%). Many students reported seeing a physician make an unnecessary referral (2,042/3,137; 65%) or order a more expensive test or treatment (1,790/3,136; 57%) in response to a patient request.
Students at the 10 participating medical schools were asked to report the number of times they had observed a specific behavior. Percentages calculations are not all based on a denominator of 3,395 because of missing responses to some survey items; the denominator is provided for each item. Percentages may not add up to 100% because of rounding.

### Cost-conscious role-modeling behaviors

<table>
<thead>
<tr>
<th>Type of behavior (no. of respondents)</th>
<th>Responses, no. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Never</td>
</tr>
<tr>
<td>Seek cost-effectiveness data to inform their clinical decision making (n = 3,158)</td>
<td>666 (18)</td>
</tr>
<tr>
<td>Initiate a conversation about costs of care when discussing treatment options (n = 3,145)</td>
<td>386 (12)</td>
</tr>
<tr>
<td>Explain to a patient why a particular diagnostic test is not necessary (n = 3,073)</td>
<td>269 (9)</td>
</tr>
<tr>
<td>Discuss costs of care with students or other members of the health care team when making patient care decisions (n = 3,070)</td>
<td>334 (11)</td>
</tr>
<tr>
<td>Ask a student or other member of the health care team to explain how a test result will affect patient management (n = 3,061)</td>
<td>459 (15)</td>
</tr>
<tr>
<td>Praise a student or resident for ordering a cost-effective diagnostic workup (n = 3,049)</td>
<td>1,361 (45)</td>
</tr>
<tr>
<td>Point out examples of waste in the health care system (n = 3,072)</td>
<td>324 (11)</td>
</tr>
</tbody>
</table>

### Potentially wasteful role-modeling behaviors

<table>
<thead>
<tr>
<th>Type of behavior (no. of respondents)</th>
<th>Responses, no. (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Never</td>
</tr>
<tr>
<td>Refer a patient to a specialist because the patient wants it even when the physician does not believe a referral is indicated (n = 3,137)</td>
<td>1,059 (35)</td>
</tr>
<tr>
<td>Prescribe a brand name drug when an equivalent generic is available because a patient asks for the brand name drug specifically (n = 3,136)</td>
<td>1,657 (53)</td>
</tr>
<tr>
<td>Order a more expensive test or treatment because a patient requests it even if it offers only a small potential benefit compared to less costly alternatives (n = 3,136)</td>
<td>1,356 (43)</td>
</tr>
<tr>
<td>Order numerous tests all at once rather than waiting to see the results of initial screening tests first (n = 3,136)</td>
<td>797 (25)</td>
</tr>
<tr>
<td>Repeat tests rather than attempt to obtain recently performed test results (e.g., by requesting a patient’s outside records) (n = 3,134)</td>
<td>895 (28)</td>
</tr>
<tr>
<td>Criticize a student or resident for failing to order routine daily labs on a stable hospitalized patient (n = 3,056)</td>
<td>1,764 (58)</td>
</tr>
</tbody>
</table>

*Students at the 10 participating medical schools were asked to report the number of times they had observed a physician role modeling each behavior during the past year.

### Relationship between regional health care intensity and reported exposure to physician role-modeling behaviors

There were no significant differences in our measures of health care intensity between HRRs that were (n = 10) and were not (n = 297) associated with a participating medical school (Table 4). Students training in regions with higher health care intensity reported observing significantly fewer cost-conscious role-modeling behaviors (Table 5). This relationship was strongest for the ratio of physician visits per decedent within the HRR compared with the U.S. average, followed by the hospital care intensity index and the ratio of medical specialty to procedures threat patient safety and that spending more money on health care does not necessarily lead to better health outcomes. However, students also perceive barriers to cost-conscious controlling for sex and year in school (all P < .001). Measures of regional health care intensity were not significantly associated with reported exposure to potentially wasteful role-modeling behaviors in unadjusted or adjusted analyses. These findings did not change when responses from students who were not offered an incentive for participation were excluded (data not shown).

### Discussion

This large, multisite survey study demonstrates that U.S. medical students generally agree with the concept of stewardship and believe that physicians should consider and try to contain costs when caring for patients. They recognize that excess testing and unnecessary procedures threaten patient safety and that spending more money on health care does not necessarily lead to better health outcomes. However, students also perceive barriers to cost-conscious...
The hospital care intensity index represents the mean of the number of days decedents spent in the hospital adjusted for sex and year in school.

Regional health care intensity in the hospital referral region encompassing the majority of hospitals where students of each participating medical school spent the majority of their hospitalization time during the past year was considered to be the hospital referral region associated with each of the 10 participating medical schools. All measures are hospital-referral-region-level per capita data from the Dartmouth Atlas of Health Care's End-of-Life Chronic Illness Care database (adjusted for age, sex, race, and chronic illness condition). The hospital care intensity index represents the mean of the number of days decedents spent in the hospital and the number of physician visits they experienced as inpatients (both adjusted for age, sex, race, and chronic condition and reported as ratios compared with the U.S. average).

Table 4
Regional Health Care Intensity of Hospital Referral Regions Associated and Not Associated With U.S. Medical Schools Participating in 2015 Survey

<table>
<thead>
<tr>
<th>Regional health care intensity measureb</th>
<th>Hospital referral regions</th>
<th>Associated with a participating school (n = 10)</th>
<th>Not associated with a participating school (n = 297)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ratio of physician visits per decedent compared with U.S. average</td>
<td>0.81 (0.13)</td>
<td>0.93 (0.25)</td>
<td>.30</td>
<td></td>
</tr>
<tr>
<td>Hospital care intensity indexc</td>
<td>0.81 (0.15)</td>
<td>0.92 (0.27)</td>
<td>.30</td>
<td></td>
</tr>
<tr>
<td>Ratio of medical specialty to primary care physician visits per decedent</td>
<td>0.98 (0.12)</td>
<td>1.08 (0.32)</td>
<td>.33</td>
<td></td>
</tr>
</tbody>
</table>

*The primary hospital referral region associated with each of the 10 participating medical schools was considered to be the hospital referral region that encompassed the majority of hospitals where students from that school rotated during the 2014–2015 academic year.

Regional health care intensity measures are hospital-referral-region-level per capita data from the Dartmouth Atlas of Health Care End-of-Life Chronic Illness Care database (adjusted for age, sex, race, and chronic illness) and reflect care intensity during the last two years of life for Medicare beneficiaries aged 67 years or older with chronic illnesses who died in 2012 (termed “decedents”).

The hospital care intensity index represents the mean of the number of days decedents spent in the hospital and the number of physician visits they experienced as inpatients (both adjusted for age, sex, race, and chronic condition and reported as ratios compared with the U.S. average).

Table 5
Relationship Between Regional Health Care Intensity and Observed Physician Role-Modeling Behaviors As Reported by U.S. Medical Students, 2015 Survey

<table>
<thead>
<tr>
<th>Regional health care intensityb</th>
<th>Reported exposure to cost-conscious role-modeling behaviorsa</th>
<th>Reported exposure to potentially wasteful role-modeling behaviorsa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unadjusted</td>
<td>Adjustedc</td>
</tr>
<tr>
<td>Ratio of physician visits per decedent compared with U.S. average</td>
<td>-4.4 (0.8)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Hospital care intensity indexc</td>
<td>-3.9 (0.7)</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Ratio of medical specialty to primary care physician visits per decedent</td>
<td>-2.9 (0.7)</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>

*Only data from students who answered all role-modeling survey items within a given scale were included (n = 3,015 for the scale summarizing student exposure to cost-conscious role-modeling behaviors; n = 3024 for the scale summarizing student exposure to potentially wasteful role-modeling behaviors). Students used a 4-point scale (0 = never, 1 = rarely [1–2 times], 2 = sometimes [3–5 times], 3 = often [6+ times]) to indicate the frequency with which they observed seven cost-conscious role-modeling behaviors and six potentially wasteful role-modeling behaviors during the past year.

**Health care intensity in the hospital referral region encompassing the majority of hospitals where students of each of the 10 participating medical schools rotated during the 2014–2015 academic year. All measures are hospital-referral-region-level per capita data from the Dartmouth Atlas of Health Care's End-of-Life Chronic Illness Care database (adjusted for age, sex, race, and chronic illness) and reflect care intensity during the last two years of life for Medicare beneficiaries aged 67 years or older with chronic illnesses who died in 2012 (termed “decedents”).

Beta-coefficients represent the change in medical student scores on the 21-point scale summarizing student exposure to cost-conscious role-modeling behaviors or the 18-point scale summarizing student exposure to potentially wasteful role-modeling behaviors per unit increase in each measure of regional health care intensity.

**Adjusted for sex and year in school.

The hospital care intensity index represents the mean of the number of days decedents spent in the hospital and the number of physician visits they experienced as inpatients (both adjusted for age, sex, race, and chronic condition and reported as ratios compared with the U.S. average).

Encouragingly, the majority of students in this study reported observing cost-conscious physician role-modeling behaviors. However, many students also reported observing potentially wasteful role-modeling behaviors such as excessive use of diagnostic tests and unnecessary referrals, which may erode values taught in more formal settings and adversely affect students’ intended and actual behaviors.

As would be expected, third- and fourth-year students reported greater exposure to physician role-modeling behaviors than first- and second-year students, and their responses suggest a greater awareness of how physician behaviors affect the broader health care system. However, third- and fourth-year students also perceived more barriers to cost-conscious care. Several innovative curricula have been developed to equip trainees with the knowledge and skills they need to provide high-value, cost-conscious care. Our findings suggest that schools using such curricula should introduce the concepts of stewardship and systems thinking early in training, equip students with strategies to help overcome perceived barriers to cost-conscious care, and encourage reflection and discussion about whether the learning environment reinforces what is taught in formal curricula with respect to cost-conscious care.

Although physician role models are important drivers of the informal and hidden curricula experienced by students, they themselves are subject...
to the social pressures, norms, and practice patterns of their institution and region.48 In keeping with this, students training in regions with higher health care intensity reported observing fewer cost-conscious role-modeling behaviors than students training in regions with less intense use of health care resources. These students may thus be exposed to (and potentially imprinted by) a culture of medical practice characterized by higher-spending practice patterns. Health care system reform (e.g., value-based reimbursement models, increased cost transparency44) and care models that promote trusting physician–patient relationships60 may make cost-conscious role-modeling behaviors more likely to occur. However, our findings also suggest that medical schools (especially those located in high-health-care-intensity regions) may benefit from additional faculty development related to role modeling cost-conscious care.

Efforts to improve role modeling should start by encouraging faculty to develop an awareness that any action observed by a learner constitutes role modeling27 and can be used deliberately as a teaching tool.41 For example, encounters with patients who request unnecessary diagnostic tests can be treated as valuable opportunities to show students how to engage in shared decision making around the issue of costs.62 Directing learners’ attention toward role-modeled behaviors—either by discussing them before an encounter or reflecting on them after—increases the likelihood that role modeling will be noticed and absorbed.61 Patients are more receptive to discussing costs when they trust their physician,60 so communication and relationship-building skills deserve particular attention and reinforcement. Similarly, faculty can seek cost-effectiveness data in a way that is visible to students, praise them for proposing cost-effective plans of care, and encourage them to include “value” in their case presentations.63,64 Medical schools can also strategically expose students to physicians who are known to role model high-value, cost-conscious care. Such efforts could include the creation of training experiences or branch campuses in regions with lower health care intensity.

Regional health care intensity was not associated with reported exposure to potentially wasteful role-modeling behaviors in this study. However, these role-modeling behaviors may be more difficult for students to recognize; for example, students may not realize that testing is excessive or that a referral is unnecessary unless the physician they are observing makes that explicit to them. Thus, potentially wasteful behaviors may have more insidious effects on students, contributing to a hidden curriculum that is more invisible in its presence and impact than formal learning activities.44 Providing opportunities for students to reflect on and evaluate the practice patterns they observe may be one way medical schools can help students recognize and learn from role-modeled behaviors.46,65 The generalizability of our results is supported by the inclusion of private and public medical schools that are geographically distributed across the United States. Furthermore, the characteristics of respondents were similar to those of the total sampled population and U.S. medical students in general, reducing concerns about nonresponse bias. Nevertheless, our study has limitations. First, the 10 participating schools were recruited through the AMA Accelerating Change in Medical Education initiative,29 so the findings reported here may not reflect the attitudes and experiences of all U.S. medical students. Second, our survey may have omitted key attitudes, barriers, or role-modeling behaviors that were not identified in our review of the literature and published surveys of physicians. Third, our classification of role-modeling behaviors as cost-conscious or potentially wasteful, although based on the literature, may not apply in all situations and does not fully capture the complex trade-offs between financial and nonfinancial resources that physicians make in practice.66

Fourth, student responses to the role-modeling items were based on recall and may not accurately or completely reflect their actual experiences. Likewise, students were not asked where they had observed particular role-modeling behaviors (e.g., inpatient vs. outpatient settings) or about the behaviors of residents and fellows, who also serve as role models for students. Fifth, health care intensity may not accurately reflect the health care intensity actually experienced by individual students within that region. Students may also rotate at hospitals outside the primary HRR associated with their school, and health care intensity at those hospitals may differ from that of hospitals within the primary HRR.

Sixth, Medicare-claims-based data, although commonly used, are imperfect measures of health care intensity, and the most recent data available at the time of this study were from 2012. Finally, cross-sectional surveys cannot establish cause-and-effect relationships, so associations should be interpreted with caution.

In conclusion, this study describes the attitudes and experiences of U.S. medical students related to cost-conscious care and demonstrates that students report observing fewer cost-conscious role-modeling behaviors in regions with higher health care intensity. Efforts to enhance physician role modeling in undergraduate medical education may play an important role in preparing the next generation of physicians to address health care costs.

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