serving to instill confidence and trust, may have the unintended effect of preserving a paternalistic view of physicians as we strive for a more patient-empowered paradigm of care.

As professionals, it is important to be aware that patients and families may be affected by our appearance and attire. In the absence of compelling reasons to wear nonprofessional attire, physicians should consider patient preferences in the interest of fostering comfort and trust. However, the impact of the white coat is attributable to its use over time and its recognizability as a brand label. Brand labels can be changed, and if the disadvantages of the white coat or any other professional symbol are demonstrated to outweigh their benefits, we should consider a different branding mechanism (e.g., badges or other identifying attire). Finally, we should not oversell the importance of attire. While professional appearance might contribute to first impressions, professional behavior is likely to be far more important to patients and families.

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RESEARCH LETTERS

Variation in Medication Adherence in Heart Failure

Although recent studies have demonstrated geographic variation in pharmaceutical use and spending,1–4 regional variation in medication adherence in Medicare has not been explored.5 Medication adherence is a critical quality measure and is especially important for Medicare beneficiaries with heart failure (HF), a common condition in which medications can save lives and reduce downstream costs.6 We used 2007-2009 national Part D data for a 5% random sample of Medicare beneficiaries to study regional variation in HF medication adherence.

Methods. Our selection criteria included the following: (1) being 18 years or older; (2) having at least 1 inpatient or 2 (nonlaboratory) outpatient claims between January 1, 2007, and December 31, 2009, with selected International Classification of Diseases, Ninth Revision (ICD-9) codes indicating HF on primary, secondary, or third diagnosis; (3) being on at least 1 drug regimen from 1 of 3 therapeutic classes: β-blockers, angiotensin-converting enzymes inhibitors (ACEs) or angiotensin receptor antagonists (ARBs), and/or diuretics7; and (4) being continuously enrolled in Medicare Parts A, B, and D during the follow-up period. The follow-up period was 1 year after the first prescription drug of interest was filled, censored at the end of the study period (December 31, 2009), or death. The resulting 178,102 beneficiaries were assigned to 306 Dartmouth hospital referral regions (HRRs) based on their zip code of residence.

The main outcome was adherence, as measured by medication possession ratio (MPR), which was defined as the ratio of total number of pills the patient had (numerator) over the total number of pills the patient should have had (denominator) during the follow-up period.8 We then defined an indicator for good adherence (1, MPR ≥0.80; 0, otherwise). The denominator for MPR can vary for a patient over time because patients may initiate different drugs at different times. For example, consider a patient who filled her first β-blocker prescription on January 1, 2008, and her first ACE prescription on March 1, 2008. Her MPR in each of the first 2 months would be the number of β-blocker pills dispensed by the pharmacy that month divided by 30, while her MPR for the third month would be the total number of β-blocker and ACE pills divided by 60 (30 days × 2 drugs). We considered drugs in the same therapeutic class substitutable, so we did not double count the overlapped pills for multiple drugs in the same class.

We defined 3 additional prescribing measures: (1) gross spending on pharmaceuticals including Part D plan payment before rebates, beneficiary out-of-pocket spending, and subsidies; (2) the number of monthly prescriptions filled (day’s supply/30); and (3) intensity of medication treatment, defined as the proportion of pa-
patients receiving all 3 drug classes among those on at least 1 regimen.

We conducted individual-level linear regressions that included HRR indicators and a set of adjustment variables including patient demographics, insurance status, and clinical characteristics. We then calculated the adjusted outcomes for each HRR (thereby netting out differences between HRRs in those patient characteristics) and reported variation statistics and correlation between adjusted outcomes analysis, as previously described.9

Results. On average, 52% of patients had good adherence (MPR ≥0.8) for HF medications, but the proportion of having good adherence varied by area, from the lowest 36% to the highest 71%. There was similar variation in the intensity of medication treatment and adherence among HRRs. Drug spending varies more across HRRs than the number of prescriptions (Table), partially owing to the mix of drugs used. For example, the area at the 90th percentile of drug spending had per-person drug spending that was 31% higher than the area at the 10th percentile of drug spending but had only 15% higher number of prescriptions. Drug spending was moderately positively correlation with intensity of treatment and the number of prescriptions ($r = 0.19$; $P = .001$) but had little correlation with adherence measures ($r = 0.04$; $P = .44$).

Comment. We found that areas with higher drug spending did not have systematically better adherence. This suggests that areas with higher drug spending are not necessarily caring for patients with HF more efficiently. There are several limitations to our study, however. First, our adherence measure is imperfect, as with most MPR-based metrics, we did not capture emerging contraindications, unfilled prescriptions, untaken pills after filling prescriptions, or changes in physicians’ orders. Second, we could not completely adjust for differences in patient severity or patient preferences that differ across areas.

Nonetheless, our study provides new information on the variation in medication adherence in patients with HF using national Medicare Part D data. We found that although only 52% of patients are adherent in the average area, some areas have substantially more success in producing patient adherence than others. Areas with better adherence can provide a useful benchmark for what is achievable, and system-level quality metrics that incorporate adherence, rather than focusing solely on drug spending, could promote more efficient use of resources.

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Author Contributions: Dr Zhang and Mr Wu had full access to all the data in the study and take responsibility for the integrity of the data and the accuracy of the data analysis. Study concept and design: Zhang, Fendrick, and Baicker. Acquisition of data: Zhang and Wu. Analysis and interpretation of data: Zhang, Wu, Fendrick, and Baicker. Drafting of the manuscript: Zhang and Wu. Critical revision of the manuscript for important intellectual content: Zhang, Fendrick, and Baicker. Statistical analysis: Zhang, Wu, and Baicker. Obtained funding: Zhang, Administrative, technical, and material support: Zhang. Study supervision: Zhang and Fendrick.

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Table. Variation in Adjusted Drug Use and Adherence in Different Hospital Referral Regions

<table>
<thead>
<tr>
<th>Variable</th>
<th>Median (Range)</th>
<th>25th-75th Percentile</th>
<th>Mean (SD)</th>
<th>90th/10th</th>
<th>75th/25th</th>
<th>Coefficient of Variation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drug spending</td>
<td>479 (336-681)</td>
<td>445-508</td>
<td>480 (52.84)</td>
<td>1.31</td>
<td>1.14</td>
<td>0.11</td>
</tr>
<tr>
<td>No. of prescriptions</td>
<td>19.47 (15.98-23.81)</td>
<td>18.80-20.25</td>
<td>19.58 (1.15)</td>
<td>1.15</td>
<td>1.08</td>
<td>0.06</td>
</tr>
<tr>
<td>Intensity of treatment</td>
<td>0.43 (0.29-0.62)</td>
<td>0.41-0.46</td>
<td>0.44 (0.04)</td>
<td>1.26</td>
<td>1.13</td>
<td>0.10</td>
</tr>
<tr>
<td>MPR ≥0.8</td>
<td>0.52 (0.36-0.71)</td>
<td>0.48-0.56</td>
<td>0.52 (0.05)</td>
<td>1.31</td>
<td>1.15</td>
<td>0.10</td>
</tr>
</tbody>
</table>

Abbreviation: MPR, medication possession ratio.

*All drug measures are only for 3 therapeutic drug classes of study interest: β-blockers, angiotensin-converting enzymes or angiotensin receptor antagonists, and diuretics. Intensity of drug treatment is defined as the proportion of patients receiving these 3 therapeutic classes.*
since 1960, US expenditures have shifted from spending 2.7 times more on food than health care ($74 billion vs $27 billion) to spending 2 times more on health care than food ($2.5 trillion vs $1.25 trillion).\(^1,2\)

Despite significant increases in health care spending, obesity and diabetes mellitus rates have increased dramatically.\(^3\)

Schools of medicine, nursing, and allied health train health-care practitioners to diagnose, treat, and manage disease. Schools of culinary arts train chefs to feed the public or to advise the food industry. Rarely, however, do medical and culinary experts share information, skills, and ideas about how these 2 professional communities might partner to diminish rates of obesity and diseases related to dietary and lifestyle choices.

A desire to establish partnerships between the medical and culinary communities led to the creation of the continuing education conference, “Healthy Kitchens, Healthy Lives—Caring for Our Patients and Ourselves” (www.healthykitchens.org).\(^4\) This 4-day conference has been copresented by Harvard University and The Culinary Institute of America 8 times and includes presentations by nutritional epidemiologists, registered dietitians, chef educators, exercise physiologists, and behavioral experts. Registrants attend didactic and interactive (ie, hands-on cooking) plenary sessions and workshops. (See eAppendix for additional details; http://www.jamainternalmed.com.)

The conceptual model for this program was influenced by the observation that for health care professionals, practicing a healthful behavior oneself (eg, exercise, wearing a seat belt) is a powerful predictor of counseling patients about these same behaviors.\(^5\) We explored the possibility that inclusion of “culinary education” in the form of cooking demonstrations and participatory hands-on cooking workshops, combined with more traditional didactic, nutrition-related presentations, would result in changes in behavior among participants’ personal habits and their perceived ability to advise overweight or obese patients. Herein, we describe changes in personal and professional nutrition-related behaviors reported by participants (n = 387) before and 3 months after this educational experience.

Methods. We conducted an anonymous survey of registrants’ self-reported nutrition-related behaviors at the start of the conference, March 2010, and 12 weeks later (eAppendix). Educational components included didactic presentations relating to nutritional epidemiology and physiology, science of exercise and mindfulness, and culinary demonstrations, hands-on cooking, and tastings.

Responses (at baseline and 12 weeks later) were not matched for participants, as these were anonymous. To test for the equality of 2 proportions, we used the \(\chi^2\) test for \(2 \times 2\) tables.\(^6\) Since we could not take into account paired data given the anonymity of the responses, the \(P\) values reported herein are conservative. We also investigated the relationship between personal nutrition behaviors and professional counseling behaviors with Spearman rank correlations (eAppendix).

Results. Of 387 registrants, 219 (57%) completed the survey at baseline and 192 (50%) completed the follow-up survey (Table). A total of 265 (66%) were physicians. Respondents reported significant positive changes in frequency of cooking their own meals (pretest, 38%; posttest, 74%; \(P < .001\)); personal awareness of calorie consumption (pretest, 54%; posttest, 64%; \(P \leq .05\)); frequency of vegetable consumption (pretest, 69%; posttest, 85%; \(P \leq .04\)); nut consumption (pretest, 53%; posttest, 63%; \(P \leq .04\)), and whole grain consumption (pretest, 67%; posttest, 84%; \(P < .001\)); ability to assess a patient’s nutrition status (pretest, 46%; posttest, 81%; \(P < .001\)); and ability to successfully advise overweight or obese patients regarding nutritional and lifestyle habits (pretest, 40%; posttest, 81%; \(P < .001\)). At the 3-month follow-up, there were significant, modest correlations between clinicians’ self-reported diet quality and their ability to advise overweight and obese patients on nutrition and lifestyle changes (correlations, 0.35−0.44; \(P < .001\)) (eAppendix).

Comment. We explored the possibility that the inclusion of “culinary education” in the form of cooking demonstrations and hands-on cooking, as adjuncts to traditional didactic, nutrition presentations, would result in measurable positive changes in both personal and professional nutrition-related behaviors among participating health care professionals. Comparing survey results from baseline to follow-up at 3 months suggest these changes occurred.

Limitations to this study include its modest sample size, response rates, and the anonymous nature of the survey. In addition, outcomes were based on self-report and were limited to a 3-month follow-up. The sustainability of the observed changes remains unstudied, and, the impact of physicians’ changes on their patients’ behaviors and clinical outcomes over time were beyond the scope of this initial study (eAppendix).

Many health care professionals aspire to advise their patients about dietary habits and to serve as role...