personal preferences for hospice were more likely than others to report discussing hospice with their patients earlier. Physicians should consider their personal preferences for hospice as a factor as they care for terminally ill patients with cancer. Physicians with negative views of hospice may consider pursuing additional education about how hospice may help their patients.

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Correction: This article was corrected on January 8, 2014, to fix the value of the number of respondents reported in the Methods section.

Posttraumatic Stress Disorder and Medication Nonadherence in Patients With Uncontrolled Hypertension

Posttraumatic stress disorder (PTSD) is common in primary care patients1 and is associated with psychological distress, suicide risk, and disability. Posttraumatic stress disorder also increases risk of incident and recurrent cardiovascular events,2 possibly by reducing medication adherence.3 Prior studies showing an association between PTSD and medication nonadherence are limited by their use of self-report to measure adherence as PTSD can bias reporting of negative behaviors.4 We evaluated the association between PTSD and antihypertensive medication adherence using electronic monitoring in primary care patients with uncontrolled hypertension.

Methods | The institutional review board of Columbia University Medical Center, New York, New York, approved the protocol. All patients provided written informed consent. We enrolled a convenience sample of patients with uncontrolled hypertension from an academic hospital-based primary care

Figure. Posttraumatic Stress Disorder (PTSD) Symptoms and Nonadherence to Antihypertensive Medications

Nonadherence was defined as taking less than 80% of the antihypertensive regimen. Error bars represent 95% CIs.
clinic in New York City. Patients were eligible if they had elevated blood pressure (BP) on 2 consecutive clinic visits prior to enrollment (BP ≥ 140/90 mm Hg or ≥ 130/80 mm Hg if they had diabetes or chronic kidney disease). Patients were ineligible if they had dementia, psychosis, active substance abuse, or resided in an institutional setting.

We evaluated PTSD using the 4-item Primary Care PTSD screen, which asks patients whether, in response to a traumatic event, they had current PTSD symptoms (reexperiencing, numbing, avoidance, and hyperarousal). A cutoff point of 3 on this screen has good sensitivity and specificity (>80%) for diagnosing PTSD compared with a clinical interview. We assessed medication adherence during the interval between 2 subsequent clinic visits using an electronic pillbox (MedSignals; MedSignals Corporation). Each BP medication was stored in 1 of 4 pillbox compartments. The pillbox records the date and time when each compartment is opened. Regimen adherence was calculated as the mean adherence to monitored medications, with adherence to each medication calculated as the percent of days the prescribed number of doses was taken.

Patients were categorized as nonadherent if regimen adherence was less than 80%. Logistic regression was used to determine whether PTSD symptoms were associated with nonadherence after adjusting for covariates commonly associated with adherence (age, sex, race, ethnicity, number of blood pressure medications, and depressive symptoms measured by the 8-item Patient Health Questionnaire).

### Results
Between November 1, 2011, and June 30, 2013, we identified 123 patients who met eligibility criteria; 114 (93%) consented and 98 (80%) had usable pillbox data. The mean (SD) age was 64 (9) years, 74 were women (76%), 79 Hispanic (81%), and 28 white (29%). Fifty-nine percent (n = 58) had no PTSD symptoms, 21% (n = 21) had 1 to 2 symptoms, and 19% (n = 19) had 3 to 4 symptoms, consistent with a positive screening result for PTSD.

The mean number of prescribed BP medications was 2.6 (0.9). Adherence was monitored for a mean (SD) of 56 (43) days. Median regimen adherence was 86% (interquartile range, 58%-97%), and 41% of the sample was nonadherent (<80% of days). In unadjusted analysis, there was a graded association between PTSD symptoms and medication nonadherence (Figure). Sixty-eight percent of patients (13 of 19) who screened positive for PTSD were nonadherent compared with 26% of patients (15 of 58) without any PTSD symptoms (P = .001). In adjusted analyses, PTSD symptoms continued to be associated with nonadherence; those who screened positive for PTSD had 5.2 (95% CI, 1.1-24.4) increased odds of nonadherence compared with those without PTSD symptoms (P = .04; Table).

In conclusion, to our knowledge, this study is the first to demonstrate that PTSD is an independent risk factor for nonadherence among patients with uncontrolled hypertension and offers a potential mechanism by which PTSD is associated with cardiovascular disease. Limitations include its modest sample size, recruitment from a single urban practice, and brief assessment period. Given the prevalence of PTSD and its strong association with medication nonadherence, our findings provide impetus to evaluate the benefit of enhanced screening and treatment for PTSD in medical settings to improve cardiovascular risk in these patients.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Unadjusted Odds Ratio (95% CI)</th>
<th>P Value</th>
<th>Adjusted Odds Ratio (95% CI)</th>
<th>P Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC-PTSD score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reference 0</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>1-2</td>
<td>3.82 (1.34-10.87)</td>
<td>.01</td>
<td>4.22 (1.33-13.51)</td>
<td>.02</td>
</tr>
<tr>
<td>3-4</td>
<td>6.21 (2.00-19.23)</td>
<td>.002</td>
<td>5.18 (1.10-24.39)</td>
<td>.04</td>
</tr>
<tr>
<td>Age</td>
<td>0.95 (0.91-1.00)</td>
<td>.05</td>
<td>0.96 (0.91-1.01)</td>
<td>.14</td>
</tr>
<tr>
<td>Male</td>
<td>0.76 (0.30-1.93)</td>
<td>.57</td>
<td>0.76 (0.26-2.17)</td>
<td>.60</td>
</tr>
<tr>
<td>Race/ethnicity</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Hispanic</td>
<td>1.39 (0.51-3.20)</td>
<td>.52</td>
<td>1.62 (0.50-5.29)</td>
<td>.43</td>
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<tr>
<td>White</td>
<td>0.74 (0.30-1.83)</td>
<td>.52</td>
<td>1.10 (0.38-3.22)</td>
<td>.86</td>
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<tr>
<td>Blood pressure medications, No.</td>
<td>1.60 (1.01-2.54)</td>
<td>.05</td>
<td>1.66 (0.99-2.78)</td>
<td>.06</td>
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<tr>
<td>Depressive symptoms, 8-item PHQ score</td>
<td>1.08 (1.01-1.16)</td>
<td>.03</td>
<td>1.00 (0.90-1.10)</td>
<td>.90</td>
</tr>
</tbody>
</table>

Abbreviations: Ellipses, not applicable; PC-PTSD, Primary Care PTSD screen; PHQ, Patient Health Questionnaire; PTSD, posttraumatic stress disorder.
Author Contributions: Dr Kronish had full access to all the data in the study and
takes responsibility for the integrity of the data and the accuracy of the data analysis.
Study concept and design: Kronish, Edmondson.
Acquisition of data: Kronish.
Analysis and interpretation of data: All authors.
Drafting of the manuscript: Kronish, Lin, Edmondson.
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Study supervision: Voils.
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1. Liebschutz J, Saitz R, Brower V, et al. PTSD in urban primary care: high

2. Edmondson D, Cohen BE. Posttraumatic stress disorder and cardiovascular

3. Kronish IM, Edmondson D, Li Y, Cohen BE. Post-traumatic stress disorder and

4. Frueh BC, Hammer MB, Cahill SP, Gold PB, Hamlin KL. Apparent symptom


6. Ho PM, Bryson CL, Rumsfeld JS. Medication adherence: its importance in

Teaching Residents to Provide Cost-Conscious Care:
A National Survey of Residency Program Directors

Health care costs continue to rise, now accounting for nearly
$3 trillion annually. Evidence shows that physicians who recently
completed residency training practice medicine at a
higher cost than more experienced physicians.1 To address
this issue, the Medicare Payment and Advisory Commission
recommended nearly $3.5 billion in funding for graduate medical
education (GME) be reallocated to programs with curricula
that train residents to practice high-value, cost-
conscious care.2

The objective of this study was to evaluate the state of cost-
conscious care education among internal medicine resi-
dency programs in the United States.

Methods | In August 2012, the Association of Program Direc-
tors in Internal Medicine (APDIM) electronically surveyed
its membership on the state of cost-conscious care curricula
as part of an annual survey of residency program directors.3

Survey items evaluated presence of cost-conscious curri-
cula, teaching and assessment methods, and perceptions of
medical education’s role in teaching cost-conscious care.
Nonresponders received weekly e-mail reminders, and the
survey was closed in November 2012. The Mayo Clinic Insti-
tutional Review Board (IRB) approved this study. Partici-
 pant consent was waived by the IRB, and survey responders
were informed that their responses could be used for
research purposes.

Survey responses were appended with publically avail-
able data including geographic locations from the Census
Bureau, program characteristics from the American Medical
Association Fellowship and Residency Electronic Interactive
Database Access System, program-specific 3-year rolling
pass rates for certification examinations from the American
Board of Internal Medicine, and institutional characteristics
from the Accreditation Council for Graduate Medical
Education.

Multiple logistic regression models were used to test the
association between program characteristics and presence of
a formal cost-conscious curriculum. Fisher exact tests were
used to compare teaching and assessment methods used by
programs. Statistical analysis was conducted using STATA (ver-
sion 12) (StataCorp).

Results | Among the 370 programs, 295 (79.7%) responded to
the APDIM survey and 261 (70.5%) completed the cost-
conscious care questionnaire. Among respondents, 14.9%
indicated they had a formal curriculum in cost-conscious
care, while 49.8% stated they did not but were working on
it. Among programs with a formal curriculum, the most
common teaching methods were didactic teaching (97.4%),
followed by informal discussion (76.9%), and the most
frequent method of resident assessment was by faculty
(41.0%), followed by no assessment (38.5%). Among all pro-
grams, 84.9% agreed that GME has a responsibility to curtail
the rising cost of health care. However, only 47.5% agreed
that the majority of their faculty consistently role modeled
cost-conscious care, and only 33.2% agreed that residents
had access to information on costs of tests and procedures
they order.

Programs that were in the West (odds ratio [OR], 6.61; P = .004),
university based (OR, 3.33; P = .03), and had more
residency positions (36-53 positions vs ≤25 positions, OR,
6.1; P = .04) had a higher odds of having a cost-conscious
care curriculum (Table 1). Programs with a curriculum were
more likely to use didactic sessions, medical chart reviews,
web-based learning, and independent reading materials
(Table 2).

Discussion | Despite the national consensus among policy
makers and educators on medical education’s role in cost-
conscious care,2,4 less than 15% of programs had a formal
curriculum, while approximately 50% of programs were
working on one. Use of robust teaching and assessment
methods linked to practice change was limited. While fac-
ulty were the most frequently reported evaluator of resident
competence in cost-conscious care, many program directors

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