

Original Investigation

Association Between Physician Time-Unlimited vs Time-Limited Internal Medicine Board Certification and Ambulatory Patient Care Quality

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IMPORTANCE American Board of Internal Medicine (ABIM) initiatives encourage internists with time-unlimited certificates to recertify. However, there are limited data evaluating differences in performance between internists with time-limited or time-unlimited board certification.

OBJECTIVE To determine whether there are differences in primary care quality between physicians holding time-limited or time-unlimited certification.

DESIGN, SETTING, AND PARTICIPANTS Retrospective analysis of performance data from 1 year (2012-2013) at 4 Veterans Affairs (VA) medical centers. Participants were internists with time-limited (n = 71) or time-unlimited (n = 34) ABIM certification providing primary care to 68 213 patients. Median physician panel size was 610 patients (range, 19-1316), with no differences between groups ($P = .90$).

MAIN OUTCOMES AND MEASURES Ten primary care performance measures: colorectal screening rates; diabetes with glycated hemoglobin (HbA_{1c} level) less than 9.0%; diabetes with blood pressure less than 140/90 mm Hg; diabetes with low-density lipoprotein cholesterol (LDL-C) level less than 100 mg/dL; hypertension with blood pressure less than 140/90 mm Hg; thiazide diuretics used in multidrug hypertensive regimen; atherosclerotic coronary artery disease and LDL-C level less than 100 mg/dL; post-myocardial infarction use of aspirin; post-myocardial infarction use of β -blockers; congestive heart failure (CHF) with use of angiotensin-converting enzyme (ACE) inhibitor.

RESULTS After adjustment for practice site, panel size, years since certification, and clustering by physician, there were no differences in outcomes for patients cared for by internists with time-limited or time-unlimited certification for any performance measure: colorectal screening (odds ratio [OR], 0.95 [95% CI, 0.89-1.01]); diabetes with HbA_{1c} level less than 9.0% (OR, 0.96 [95% CI, 0.74-1.2]); blood pressure control (OR, 0.99 [95% CI, 0.69-1.4]); LDL-C level less than 100 mg/dL (OR, 1.1 [95% CI, 0.79-1.5]); hypertension with blood pressure less than 140/90 mm Hg (OR, 1.0 [95% CI, 0.92-1.2]); thiazide use (OR, 1.0 [95% CI, 0.8-1.3]); atherosclerotic coronary artery disease with LDL-C level less than 100 mg/dL (OR, 1.1 [95% CI, 0.75-1.7]); post-myocardial infarction use of aspirin (OR, 0.98 [95% CI, 0.58-1.68]) or β -blockers (OR, 1.0 [95% CI, 0.57-1.9]); CHF with use of ACE inhibitor (OR, 0.98 [95% CI, 0.61-1.6]).

CONCLUSIONS AND RELEVANCE Among internists providing primary care at 4 VA medical centers, there were no significant differences between those with time-limited ABIM certification and those with time-unlimited ABIM certification on 10 primary care performance measures. Additional research to examine the difference in patient outcomes among holders of time-limited and time-unlimited certificates in non-VA and nonacademic settings and the association with other ABIM goals may help clarify the potential benefit of Maintenance of Certification participation.

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Since 1936, the American Board of Internal Medicine (ABIM) has administered written tests for board certification.¹ Before 1990, this certification was time-unlimited. Subsequently, to maintain certification internists must pass an examination every 10 years.² Recently, the ABIM has required physicians to complete ABIM-sanctioned Maintenance of Certification (MOC) programs before sitting for examinations; in 2014 it changed certification labeling for those with time-unlimited certification but not participating in MOC to not meeting maintenance of certification requirements.³ This decision has proven controversial.^{4,5}

There are data suggesting that board-certified physicians provide better care than those without certification.⁶⁻¹⁰ The data also suggest that physicians with higher test scores on the board examination provide higher care quality.^{11,12} However, to our knowledge there are no studies examining the quality of care between internists with time-limited and time-unlimited certification.¹³ Indirect evidence on this relationship, based on analysis of years since graduation, is mixed. Years since board certification was correlated with less likelihood of antihypertensive treatment intensification,¹⁴ had no relationship with⁸ or improved provision⁷ of preventive services, and was associated with lower rates of post-myocardial infarction death.⁷

The literature on the relationship between board certification and quality of care is limited. Potential methodological concerns include lack of adjustment for the duration of time since board certification, lack of verification of board status, aggregation of data by board status without adjustment for individual physician performance, and combining different specialties.¹⁰ The purpose of this study was to examine whether there are differences in the quality of primary care provided between internists with time-limited board certification and those with time-unlimited certification.

Methods

The Veterans Health Administration (VA) routinely collects information on the performance of primary care physicians on a number of metrics (eTable 1 in the Supplement). These measures are collected nationally from the VA electronic health record and reports are generated quarterly by the local facilities and sent to each physician. These quarterly reports provide physicians with their performance compared with both local and national averages. These data are also available to physicians through an electronic portal at any time. These measures are used for incentive pay programs but not for retention, discipline, punitive processes, or making workload or panel adjustments at any of the VA sites. All included measures are standard Healthcare Effectiveness Data and Information Set measures for quality of primary care: colorectal screening rates; diabetes with glycated hemoglobin (HbA_{1c} level) less than 9.0%; diabetes with blood pressure less than 140/90 mm Hg; diabetes with low-density lipoprotein cholesterol (LDL-C) level less than 100 mg/dL (to convert to mmol/L, multiply by 0.0259); hypertension with blood pressure less than 140/90 mm Hg; thiazide diuretics used in multidrug hypertensive regimen; atherosclerotic coronary artery disease and LDL-C level less than

100 mg/dL; post-myocardial infarction use of aspirin; post-myocardial infarction use of β -blockers; congestive heart failure with use of angiotensin-converting enzyme inhibitor.¹⁵ Previous studies have shown good reliability and validity for these quality measures.⁸ These care indicators measure interventions that have been shown to be associated with reduced mortality¹⁶⁻²⁰ and improved quality of life.^{21,22}

We extracted performance data on internists working as primary care physicians at 4 VA medical centers (VAMCs)—Clement J. Zablocki VAMC (Milwaukee, Wisconsin), Jesse Brown VAMC (Chicago, Illinois), Hines VAMC (Chicago, Illinois), and William S. Middleton VAMC (Madison, Wisconsin)—from October 1, 2012, through September 30, 2013 (fiscal year 2013). This information was collected as part of a management review to help determine the value a facility should place on ABIM board certification status as criteria for employment and credentialing. This project was approved by the Zablocki VAMC institutional review board as a quality improvement project. This limited data for this project to those obtainable as part of the authors' review of quality improvement data or publicly available information.

Physician-level data included sex and year of initial certification as well as whether the physician was meeting maintenance of certification requirements. The year of certification and certification status were obtained from the ABIM website. Year of initial certification was considered to be a good proxy for graduation date and years of practice, since more than 85% of candidates pass their initial boards in the first year or two after completing residency.²³

To be included in the analysis, primary care physicians had to be board certified and were classified as either having time-limited or time-unlimited certification. Internists who did not achieve board certification ($n = 2$) were excluded. Physicians were also excluded if their employment start date was after September 30, 2012, or if they separated from employment before October 1, 2013.

Unadjusted comparisons between the 2 groups were performed either with χ^2 test for proportions or t test for continuous measures. For multivariable analyses, the unit of analysis was the patient, adjusted for clustering on physicians and nesting within the site of care. Comparisons were made using generalized linear latent and mixed methods multilevel (hierarchical) regression models. In addition, physician sex, years since initial certification, and the number of patients in the panel were included as covariates. This analysis provides adjusted odds ratios but not rates.

All analyses were performed using Stata version 13.2 (StataCorp), and all testing was 2-sided. Although multiple comparisons were made, the significance threshold was set at .05 to minimize type II errors, since the priority was to avoid missing differences between groups rather than minimizing the possibility of overstating such differences.

Results

There were 105 ABIM-certified physicians at the 4 sites who were responsible for providing primary care to 68 213 pa-

tients. Of these, 34 had time-unlimited certification, 63 had current certification, and 8 had passed their board examinations but subsequently had allowed their certification to lapse. The number of included physicians at each site ranged from 11 to

39. The median patient panel size was 610 (range, 19-1316) patients per physician (Table 1). There was no difference in panel size between the 4 sites ($P = .13$) or the 3 types of certification ($P = .90$). Physicians with time-unlimited certification had prac-

Table 1. Physician and Practice Characteristics

Characteristic	Median (Range)		
	Time-Limited		Time-Unlimited (n = 34 Internists)
	Current (n = 63 Internists)	Lapsed (n = 8 Internists)	
Years since initial certification, mean (SD)	14.1 (5.8)	16 (4.4)	29.6 (6.1)
Women, No. (%)	28 (45)	5 (63)	8 (29)
No. of patients (N = 68 213)	43 134	6936	18 143
Practice size	609 (45-1305)	964 (49-1255)	592 (19-1316)
No. of physicians per VAMC			
Hines	25	3	11
Jesse Brown	18	3	5
Madison	4	1	6
Zablocki	16	1	12
No. of patients with			
Diabetes (n = 11 679)	7479	1253	2947
Hypertension (n = 27 239)	17 352	2800	7079
Cardiovascular disease (n = 8162)	5097	2207	808
Post myocardial infarction (n = 2942)	1831	342	769
Congestive heart failure (n = 1983)	1298	161	524
Panel patients with			
Diabetes	110 (4-240)	147 (3-256)	100 (9-223)
Hypertension	264 (5-175)	381 (12-558)	241 (12-534)
Cardiovascular disease	66 (5-175)	120 (3-173)	67 (2-183)
Post myocardial infarction	21 (0-71)	28 (2-56)	14 (0-102)
Congestive heart failure	18 (61)	18 (1-36)	15 (1-50)
Site patients (per VAMC) with			
Diabetes			
Hines	90 (5-193)	85 (40-256)	110 (9-223)
Jesse Brown	157.5 (4-240)	221 (3-230)	102.5 (18-202)
Madison	124.5 (80-168)	76 (76-76)	177 (122-208)
Zablocki	65 (23-218)	147 (147-147)	50 (23-146)
Hypertension			
Hines	185 (25-481)	186 (128-558)	296.5 (12-498)
Jesse Brown	371.5 (17-519)	450 (12-499)	209 (50-522)
Madison	364.5 (158-373)	169 (169-169)	454 (296-534)
Zablocki	148.5 (59-571)	381 (381-381)	118 (46-422)
Cardiovascular disease			
Hines	67 (10-157)	63 (10-173)	76 (2-165)
Jesse Brown	66 (5-175)	142 (3-15)	66 (10-109)
Madison	99 (67)	54 (54-54)	147 (103-183)
Zablocki	47 (155)	120 (120-120)	34 (3-153)
Post myocardial infarction			
Hines	22 (3-52)	17 (2-36)	18 (1-102)
Jesse Brown	15 (0-71)	33 (2-36)	7 (0-30)
Madison	24 (21-32)	11 (11-11)	22 (12-29)
Zablocki	24 (3-59)	56 (56-56)	13 (0-30)
Congestive heart failure			
Hines	16 (3-43)	23 (1-36)	20.5 (1-43)
Jesse Brown	23 (1-61)	17 (4-29)	10.5 (2-23)
Madison	23 (21-39)	10 (10-10)	46 (29-50)
Zablocki	16 (0-27)	18 (18-18)	9 (1-16)

Abbreviation: VAMC, Veterans Affairs medical center.

Table 2. Performance on Key Indicators by Board Certification Status (Unadjusted Bivariable Results)

Performance Measure	Patients Meeting Standard/Total, No. (%)		P Value ^a
	Time-Limited	Time-Unlimited	
Colorectal cancer screening completed (n = 36 009)	19 348/26 557 (73)	7109/9452 (75)	<.001
HbA _{1c} <9.0% (n = 11 679)	6801/8738 (78)	2324/2941 (79)	.18
Blood pressure <140/90 mm Hg among patients with diabetes (n = 11 648)	6307/8717 (74)	2204/2931 (75)	.003
LDL-C <100 mg/dL among patients with diabetes (n = 11 648)	5857/8717 (67)	1963/2931 (67)	.83
Blood pressure <140/90 mm Hg among patients with hypertension (n = 27 239)	14 180/20 149 (70)	5097/7090 (72)	.02
Thiazide diuretic use in patients taking ≥1 antihypertensive medication (n = 9126)	4314/6890 (63)	1392/2236 (62)	.76
LDL-C <100 mg/dL with history of cardiovascular disease (n = 8162)	4188/5955 (70)	1525/2207 (69)	.28
History of myocardial infarction while taking (n = 2943)			
Aspirin	1989/2235 (89)	644/708 (91)	.36
β-Blocker	1412/2228 (63)	487/715 (68)	.02
ACE inhibitor use in patients with congestive heart failure (n = 1984)	1197/1460 (82)	436/524 (83)	.53

Abbreviations: ACE, angiotensin-converting enzyme; HbA_{1c}, glycated hemoglobin; LDL-C, low-density lipoprotein cholesterol.

SI conversion factor: To convert LDL-C values to mmol/L, multiply by 0.0259.

^a Pearson χ^2 .

Table 3. Performance Measures by Veterans Administration Site

Performance Measure	Proportion of Patients Meeting Standard, No. (%)				P Value ^a
	Site A	Site B	Site C	Site D	
Colorectal screening	9633 (69)	4167 (83)	7093 (72)	6345 (78)	<.001
Patients with diabetes and					
HbA _{1c} <9%	3442 (77)	1199 (83)	2711 (75)	2014 (81)	<.001
Blood pressure <140/90 mm Hg	3218 (72)	1156 (80)	2639 (73)	1740 (70)	<.001
LDL-C <100 mg/dL	3033 (68)	1012 (70)	2282 (64)	1693 (68)	<.001
Hypertension with blood pressure <140/90 mm Hg	7282 (72)	2774 (77)	5510 (68)	4202 (69)	<.001
Uncontrolled blood pressure with thiazide	2807 (63)	587 (64)	1268 (60)	1191 (66)	<.001
Cardiovascular disease with LDL-C <100 mg/dL	2262 (71)	840 (73)	1402 (67)	1346 (70)	.004
Post myocardial infarction					
Aspirin	913 (91)	226 (96)	413 (80)	623 (91)	<.001
β-Blocker	821 (82)	189 (90)	382 (78)	549 (89)	<.001
Heart failure while taking ACE inhibitor/ARB	658 (87)	274 (84)	455 (79)	284 (77)	<.001

Abbreviations: ACE, angiotensin-converting enzyme; ARB, angiotensin II receptor blocker; LDL-C, low-density lipoprotein cholesterol.

SI conversion factor: To convert LDL-C values to mmol/L, multiply by 0.0259.

^a Pearson χ^2 .

ticed significantly longer (mean, 29.6 years) than those with current (14.1 years) or lapsed (16.0 years) certification. There were no significant differences in the sex of internists between those with time-limited (women, 45%), time-unlimited (women, 29%), and lapsed (women, 63%) certification ($P = .07$).

On unadjusted analyses, there was no difference in performance between time-limited and time-unlimited status on 6 of the standards. On the other 4 performance measures, the clinicians with time-limited board certification had worse performance that was statistically significant compared with those with time-unlimited certification (Table 2), but the absolute differences in performance were only 2% to 4%. There were differences in performance on these measures between the 4 sites (Table 3). After adjusting for site of practice, patient panel size, years since initial certification, and clustering on physician within each site, there was no difference in performance between physician groups on any measure: colorectal screening (odds ratio [OR], 0.95 [95% CI, 0.89-1.01]); patients with diabetes and HbA_{1c} level less than 9.0% (OR, 0.96 [95% CI, 0.74-1.2]); patients with diabetes and blood pressure less than 140/90 mm Hg (OR, 0.99 [95% CI, 0.69-1.4]); patients with diabetes and LDL-C level less than 100 mg/dL (OR, 1.1 [95% CI,

0.79-1.5]); patients with hypertension and blood pressure less than 140/90 mm Hg (OR, 1.0 [95% CI, 0.92-1.2]); patients with hypertension taking thiazide diuretics (OR, 1.0 [95% CI, 0.8-1.3]); patients with atherosclerotic coronary artery disease and an LDL-C level less than 100 mg/dL (OR, 1.1 [95% CI, 0.75-1.7]); post-myocardial infarction and taking aspirin (OR, 0.98 [95% CI, 0.58-1.68]); post-myocardial infarction and taking β-blockers (OR, 1.0 [95% CI, 0.57-1.9]); and patients with congestive heart failure and taking angiotensin-converting enzyme inhibitors (OR, 0.98 [95% CI, 0.61-1.6]) (Table 4). There also was no difference in quality measures among the subgroup of physicians who had allowed their certification to lapse, compared with time-limited or time-unlimited certification (eTable 2 in the Supplement).

Discussion

Previous studies of the association of board certification with patient outcomes have focused on physicians who have certification compared with those who failed or did not take their board examinations. Those studies suggest modestly better pa-

Table 4. Adjusted Performance on Key Indicators by Time-Unlimited Board Certification Status

Performance Measure	Time Unlimited, OR (95% CI) ^a
Received colorectal screening	0.95 (0.89-1.01)
Diabetes measures	
HbA _{1c} <9.0%	0.96 (0.74-1.2)
Blood pressure <140/90 mm Hg	0.99 (0.69-1.4)
LDL-C <100 mg/dL	1.1 (0.79-1.5)
Blood pressure <140/90 mm Hg, no diabetes	1.0 (0.92-1.2)
Receiving thiazide diuretic if taking ≥1 antihypertensive medication	1.0 (0.83-1.3)
LDL-C <100 mg/dL or taking moderate-strength statin among patients with coronary vascular disease	1.1 (0.75-1.7)
Post myocardial infarction patients	
Aspirin	0.98 (0.58-1.68)
β-Blocker	1.0 (0.57-1.9)
Taking ACE inhibitor/ARB with history of congestive heart failure	0.98 (0.61-1.6)

Abbreviations: ACE, angiotensin-converting enzyme; ARB, angiotensin II receptor blocker; HbA_{1c}, glycated hemoglobin; LDL-C, low-density lipoprotein cholesterol; OR, odds ratio.

SI conversion factor: To convert LDL-C values to mmol/L, multiply by 0.0259.

^a Time-limited is the reference for all analyses. Odds are adjusted for years since initial certification, participation in maintenance of certification, sex, panel size, and nested clustering on physicians within site.

tient care and outcomes among board-certified physicians. To our knowledge, this is the first study to examine the difference in performance between physicians with time-limited and time-unlimited ABIM board certification. Our adjusted results showed no significant difference between holders of time-limited and time-unlimited certificates in the VA setting. To whatever extent a goal of MOC is to improve the quality of patient care, these findings raise a question of whether that goal is being achieved, at least among internists at these VA hospitals.

The ABIM has recently highlighted the importance of continuing education and is encouraging holders of time-unlimited certificates to participate in the MOC process.²⁴ This study focused on the potential effect of ABIM certification on quality measures, but there are other goals for MOC that were not measured. Other potential benefits may include improving communication and patient-centeredness, as well as increasing physician involvement in self-assessment and quality assurance. The mission of the ABIM is “to enhance the quality of health care by certifying internists and subspecialists who demonstrate the knowledge, skills, and attitudes essential for excellent patient care.”²⁵ The American Board of Medical Specialties has articulated that “MOC acknowledges the growth and complexity of medical science, clinical care and the importance of the physician’s relationship with the patient in delivering quality outcomes.”²⁶ This study did not address these other important goals for MOC.

In promoting MOC for care quality, the ABIM has relied on previous studies that suggest a trend of physician performance decline with years from graduation from residency,²⁷ although those studies did not evaluate the board certification status of included physicians. In our study, we found no difference in performance on these measures with years since initial certification. For physicians choosing not to recertify, reasons cited include that it is time intensive, expensive, and not required for employment,⁵ as well as concern whether the current MOC process provides additional practical knowledge.^{28,29} Our findings of no differences in primary patient care performance measures between internists with time-limited and time-unlimited certification suggest that those with time-unlimited or lapsed certification may be maintaining quality practice using venues other than the ABIM MOC program.

There are several important limitations to our study. First, included physicians came from large VA medical centers that have strong academic affiliations with medical schools. Such affiliations may result in a selection bias attributable to participation in residency and fellowship education or ongoing continuing medical education available at each institution. The value of an MOC process among physicians who are not involved in these activities might be greater. Second, all physicians practiced in an environment that included robust continuous review as well as decision support and a sophisticated electronic health record. Physicians in this setting have access to their own performance measures in real time and are provided quarterly feedback benchmarked to performance at their site and nation-wide. They also receive clinical reminders to help them improve the quality of care. This might decrease potential differences in practice between internists with time-unlimited and time-limited certification that could be seen in other settings. Moreover, since interaction with the electronic health record is mandatory for both documentation and data purposes, a “technology knowledge gap” between time-unlimited and time-limited diplomates may be lessened at our facilities compared with other groups of internal medicine physicians.

Third, we were not able to measure patient-centered outcomes such as mortality, morbidity, or quality of life. The quality measures in the study were nationally accepted indicators of primary care quality and have been shown to predict mortality, morbidity, and quality of life in randomized clinical trials. Fourth, the data on individual physicians was limited to sex, panel size, practice site, and years since initial certification. Information on physician age, year of graduation, initial board scores, or duration of practice was not available to the authors as a part of quality review. It is likely that time since initial certification is a good proxy for year of completion of residency, graduation year, and years of practice, since most certified internists certify the year of completing residency. More detailed data on physician characteristics would have allowed us to explore the association of these physician variables with care quality and assess for possible confounding. Fifth, the study focused solely on quality measures and did not address other important goals for recertification.

Conclusions

Among internists providing primary care at 4 VA medical centers, there were no significant differences between those with time-unlimited ABIM certification and those with time-limited ABIM certification on 10 primary care performance measures. To whatever extent a goal of MOC is to

improve the quality of patient care, this study raises a question of whether that goal is being achieved, at least among internists at these VA hospitals. Additional research to examine the difference in patient outcomes among holders of time-unlimited and time-limited certificates in VA and nonacademic settings and the association with other ABIM goals may help clarify the potential benefit of MOC participation.

ARTICLE INFORMATION

Author Contributions: Dr Jackson had full access to all of 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: Hayes, Jackson, Hertz. **Acquisition, analysis, or interpretation of data:** All authors.

Drafting of the manuscript: Hayes, Jackson, McNutt.

Critical revision of the manuscript for important intellectual content: Hayes, Jackson, Hertz, Ryan, Pawlikowski.

Statistical analysis: Jackson, Hertz, Pawlikowski. **Administrative, technical, or material support:** Hayes, McNutt, Hertz.

Study supervision: Hayes.

Conflict of Interest Disclosures: All authors have completed and submitted the ICMJE Form for Disclosure of Potential Conflicts of Interest and none were reported.

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