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Certificate of Need and the Cost of Competition in Home Healthcare Markets

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Abstract

We used 2010-16 Medicare Cost Reports for 10,737 freestanding home health agencies (HHAs) to examine the impact of home health (HH) and nursing home (NH) certificate-of-need (CON) laws on HHA caseload, total and per-patient variable costs. After adjusting for other HHA characteristics, total costs were higher in states with only HH CON laws ($2,975,698), only NH CON laws ($1,768,097), and both types of laws ($3,511,277), compared with no CON laws ($1,538,536). Higher costs were driven by caseloads, as CON reduced per-patient costs.

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DISCLAIMER:
The views and opinions expressed here are those of the investigators and do not necessarily reflect those of the National Institutes of Health, UCI or UCLA.

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Additional research is needed to distinguish whether this is due to skimping on quality vs. economies of scale.

Keywords

Home health; nursing home; certificate-of-need; cost; regulation

INTRODUCTION

Certificate of Need (CON) programs are state regulatory programs requiring health care providers to obtain permission from a state planning authority for new or expanded services, typically services requiring large capital outlays or substantially increasing expenditures.[1] Obtaining CON approval requires providers to demonstrate that the population in the service area has an “unmet need” for the proposed services. Criteria usually account for population size, age, gender, health and number and capacity of existing providers.

The history of CON dates back to the mid-1960s, when New York State implemented the first CON program.[2] In 1974, CON programs became a federal mandate with the enactment of the National Health Planning and Resources Development Act.[3,4] This law was repealed in 1987[5] and eleven states terminated their CON programs.[6] Studies of that period concluded that hospital expenditures were not lower and did not grow at a slower rate in states with CON programs.[7] Hospitals faced with restrictions on bed growth introduced new services and technologies that compensated for costs saved by constraining beds, sometimes even leading to higher costs.[8]

Unlike CON for hospitals or nursing homes (NHs), CON for home health agencies (HHAs) is limited to restricting entry of new agencies. The effect of CON on long-term care services was not rigorously studied until the 1990s. Many prior studies examining CON for NHs and HHAs did not study the impact on costs.[9-11] Those including costs varied in the time frame they covered and the analytical sample, resulting in somewhat contradictory pictures. Grabowski et al. studied 49 states during 1981-1998 and found that states repealing CON laws did not experience significant growth in NHs or Medicaid expenditures.[12] Using 1990-1997 data, Miller et al. found that HHA expenditures increased with NH CON, but were not significantly associated with HH CON.[13] Polsky et al.[14] used 2005-2006 Medicare data for patients discharged from hospitals to examine HH admissions, rehospitalizations, Medicare expenditures and quality, concluding that among patients with an initial hospitalization, CON regulation led to fewer HH admissions but no substantial impact on quality or expenditures. Rahman et al.[15] used 1992-2009 state-level data, finding that NH, and to a lesser degree HH, spending grew faster in CON states compared to non-CON states.

These discrepancies suggest that the impact of CON may change over time as market environments in the states change. The most recent study ended in 2009, the last year of the recent recession and before the enactment of the Affordable Care Act (ACA). Since then, the Centers for Medicare and Medicaid Services (CMS) have made strong efforts to make markets more competitive by informing patients about provider quality.[16,17]

We use 2010-2016 data, after the market environment changed, to examine the impact of both HH and NH CON laws on the number of HHA patients served, variable cost per patient, and total agency cost. Our study complements existing studies in the following ways: (1) We use agencies, rather than states, as the unit of analysis, and control for agency characteristics, such as patient casemix, ownership, profit status, contracting practices, etc.; (2) We separately estimate number of patients served and costs per patient to understand how CON influences HHA behavior; (3) We estimate HHA costs separately rather than aggregating them with NH costs; (4) We use more current data, which is important in light of CMS policy and data collection changes; (5) We include both Medicare and Medicaid costs; and (6) We examine all HH care use, not just post-acute use. In 2017, 66% of all HH episodes were not preceded by a hospitalization or post-acute care stay.[18]

We hypothesize that HH CON is associated with higher patient caseloads per agency. HH CON generally restricts the number of HHAs that can serve a particular area, based on the size of the potential patient population. As long as HH CON poses a binding constraint, it should reduce the number of agencies serving each area. Allowing fewer agencies to provide services to a population of given size should increase the caseload per agency if demand for HHA services is need-based rather than induced demand.

We further hypothesize that HH CON leads to a decline in variable costs per patient. Limiting entry into the HHA market may reduce competition, thereby incentivizing HHAs to skimp on care. Moreover, higher patient caseloads within a designated geographic area shorten travel distances between patients, thereby saving on driving time and labor costs. Both mechanisms would drive down per-patient costs.

The associations of NH CON with HHA caseload and costs are theoretically indeterminate. Nursing homes might provide care similar to what would otherwise be delivered in a home- or community-based setting (substitutes). Alternatively, nursing homes may focus primarily on higher-acuity care, referring patients to HHAs once they are at a higher level of functioning but still not able to care for themselves (complements). If nursing homes and HHAs function primarily as substitutes, then by limiting nursing home care, NH CON laws would increase demand for HHA services, thereby increasing HHA caseloads and reducing per-patient costs. On the other hand, if nursing homes and HHAs function as complements, then NH CON laws would be expected to reduce HHA caseloads and increase average per-patient costs. The competing hypotheses about the effect of NH CON on the home health market underscore the importance of testing these hypotheses empirically.

MATERIALS AND METHODS

Data and study cohort

We created an analysis dataset for all free-standing Medicare-certified HHAs in the U.S. during 2010-2016 by merging data using Medicare provider ID. Annual Medicare cost reports contained information on costs, patient census, contract staffing, and low-utilization agencies, defined by CMS as those that have a small Medicare patient census and are not required to report complete data.[19] The Outcome and Assessment Information Set (OASIS) contained assessments for all Medicare and Medicaid HHA patients, including

sociodemographic, living environment and support system, health status, functional status, and health service utilization used to calculate casemix.[20] The CMS Provider-of-Service files provided information about HHA ownership changes.[21] The 2010 Census provided urbanicity data.

Figure 1 summarizes the effects of the study inclusion and exclusion criteria on cohort size. The initial sample included 12,939 unique HHAs, corresponding to 73,872 agency-year observations. After excluding agencies located outside of the U.S. states, those without the necessary cost data (e.g., agencies with low Medicare enrollment), those with incomplete covariate data, and outliers (top and bottom 1% of each outcome distribution), final sample sizes were N=55,315 agency-years (total variable costs); N=55,318 (number of unique patients); and N=55,254 (variable costs per unique patient).

Variables

Medicare cost reports are based on fiscal year, so to standardize the data, we converted all variables to calendar years for 2010-2016, using cost reports covering fiscal years 2009-2017. We defined three dependent variables: total variable costs, total number of unique patients and per-patient variable costs. Although duplicated patient counts (episodes) are theoretically preferred, only the number of unique patients was reliably measured. HHA costs were inflation-adjusted to 2016 dollars using the Consumer Price Index component for the Care of Invalids and Elderly at Home from the Bureau of Labor Statistics.[22] We chose to analyze variable rather than total (variable + fixed) costs per patient because unlike hospitals or nursing homes, HHAs are mostly “variable cost” operations with minimal capital costs. All HHA services are provided at patients’ homes and service volume can easily be adjusted to market demand conditions even in the short run.

Information about CON laws for HHAs and nursing homes by state and year was obtained from the National Conference of State Legislatures.[23] Two states (Minnesota and Wisconsin) with no NH CON laws but a moratorium on nursing homes were recoded as having NH CON, as we viewed moratoria as an extreme form of CON. A weighted agency-level wage index was calculated from the Home Health Prospective Payment System (HH PPS) payment adjustment for wages and wage-related costs.[24-30] The definition of “small agency” comes from 42 CFR 413.24 and is based on all patients, not just Medicare.

To create an agency-level casemix index (CMI), we averaged patient-level casemix. OASIS reports Home Health Resource Groups (HHRGs) for 90% of non-discharge assessments. We calculated HHRGs for the other 10% using the tables accompanying the HH PPS Grouper Software.[31] The Home Health PPS casemix system assigns casemix weights, which are separate payment weights for patients in 128 different groups defined by similar characteristics and needs. Each group’s case-mix weight is calculated as the group’s predicted mean cost relative to the overall average, with the predictions based on estimating regression models with fixed HHA effects. We applied the casemix weights published in the HH PPS Final Rule from 2008, 2012, and 2014-2016 to the HHRGs.[32] Higher weights signify increased severity and resource use.

The HHRGs' definitions and case-mix weights were significantly revised during the study period, including an ACA-related rebasing[33], so casemix was longitudinally inconsistent, reflecting definitional rather than true casemix changes. Thus we grouped agencies into deciles, based on their casemix ranking for that year, and used casemix deciles instead of actual casemix as covariates. Compared to contiguous years, 85% of agencies were within plus or minus one decile.

Statistical Analysis

Outcomes were estimated using generalized linear models (GLMs) with a log link and random HHA effects. Primary predictors were the state CON laws in effect for that agency-year (HH CON laws only; NH CON laws only; both HH CON and NH CON laws; no CON laws). Controls included the year of observation, percent of patients living in rural zipcodes, percent of patients on Medicare, whether the agency had changed ownership, casemix decile, average agency wage index, and proportion of the year when the agency: met Medicare's definition of being a small agency; was part of a chain; was not-for-profit; and had contracts for skilled nursing, HH aides and physical, occupational and speech therapy.

To facilitate interpretation of the nonlinear regression estimates, we calculated mean predicted values of the outcomes under four hypothetical scenarios, holding other covariates constant at their original values: (a) no CON laws in effect in that state during that year; (b) only HH CON laws; (c) only NH CON laws; and (d) both HH and NH CON laws. We present χ^2 statistics and p-values for the tests of the effects of (i) HH CON + NH CON, relative to no CON; (ii) HH CON only, relative to no CON (i.e., the impact of HH CON when NH CON = 0); (iii) HH CON + NH CON, relative to NH CON only (the impact of HH CON when NH CON = 1); (iv) NH CON only, relative to no CON (the impact of NH CON when HH CON = 0); and (v) HH CON + NH CON, relative to HH CON only (the impact of NH CON when HH CON = 1). Finally, we test whether (iv) is significantly different from (v), i.e., whether NH CON has a different effect when HH CON = 1 vs. 0. As these average differences in predicted values are nonlinear functions of the regression coefficients, the variance estimates are based on first-order Taylor series expansions.

Sensitivity Analyses—We also performed numerous sensitivity analyses. First, we used total costs (instead of total variable costs) as the outcome. Second, we re-estimated the models after adding back in outliers. Third, we tried treating NH moratoria as not having NH CON. Fourth, we omitted the percent of patients on Medicare, due to potential endogeneity. Fifth, we omitted the percent of rural patients, due to possible collinearity. Sixth, as only two states used HH CON but not NH CON, we tried aggregated up to a "HH CON with or without NH CON" category as well as excluded those states altogether. Seventh, to address concerns that the impact of CON laws might vary based on how binding the constraints were,[34] we used the 2010-2015 observations (which could be linked to data on NH occupancy rates) to compare (i) the original regression specification without NH occupancy rates, (ii) the same specification but adding the main effect of NH occupancy rates, and (iii) the last specification after adding interactions between NH occupancy rates and the CON indicators. Finally, we tried controlling for measures of political climate (available on-line).

RESULTS

Descriptive statistics (Table 1)

Before excluding outliers, unique patient count averaged 699 (SD = 1,597) and the variable cost per unique patient averaged $5,963 (SD = $53,180), with total variable costs averaging $2,533,132 (SD = $5,296,106). Almost 17% of HHA patients resided in rural zipcodes. About three-quarters of patients had Medicare. Almost one-quarter of agencies were chain members, about 7% were not-for-profits and 1% had changed ownership. Mean average patient case-mix index was 1.17 (SD = 0.30). About 45% of the agency-year observations were from states with no CON laws. About 42% were from states with only NH CON laws and another 12% were from states with both NH and HH CON laws. Only 1% were from states with only HH CON laws.

Regression-adjusted associations of outcomes with CON laws (Table 2)

Total variable costs were higher among agencies in states with HH-only, NH-only, and both types of CON laws (respectively $2,975,698, $1,768,097 and $3,511,277 on average, compared with $1,538,536 in states with no CON laws). The higher total costs were due to significantly higher average caseloads (respectively 928, 449 and 932 patients, compared with 371 patients), despite lower average per-patient variable costs (respectively $4,072, $5,021 and $4,857, compared with $5,292).

For total variable costs and the total number of patients, the effect of HH CON laws did not depend significantly on the presence or absence of NH CON laws and vice versa. For variable costs per patient, however, the reduction in per-patient costs associated with HH CON was smaller if states already had NH CON than if they did not (-$163 vs. -$1,220). Moreover, the significant reduction in per-patient costs associated with NH CON laws when states did not have HH CON laws in place (-$271) became positive and significant if states did have existing HH CON laws ($786).

Sensitivity analyses

Controlling for political climate produced estimates that if anything, were larger in magnitude and more significant. For all other sensitivity analyses, the estimated CON effects were similar to the original estimates and none of our conclusions changed. Estimates from these analyses are available upon request from the authors.

DISCUSSION

Despite the repeal of the federal mandate in 1987, many states continued to maintain CON laws, primarily targeted at long-term care. However, to date, relatively little research has been conducted to assess the impact of CON laws on HHAs. NH CON analyses are unlikely to generalize to HHAs because rather than the patient traveling to the provider, HHA providers travel to the patients, changing the economics of the production of care. Over the last decade, HH has increased dramatically in terms of the number of patients served, providers in the market, and dollars spent. These historical trends, which followed changes in HH payment, demonstrate that the industry is very responsive to policy and payment

changes. As the original objective of CON laws was cost containment, it is important to determine whether these laws meet this goal. Our study examined the impact of CON laws, accounting for a large array of differences across HHAs such as ownership, size, chain and profit status; input prices and contracting arrangements; and patient casemix, urbanicity and insurance type. We found evidence that both NH and HH CON laws did constrain per-patient HH costs, although the magnitude of the effect depended on a complex interaction between CON laws for HHAs versus nursing homes.

Our finding that HH CON laws led to larger HH caseloads is consistent with both our original hypothesis and the conclusions of Rahman et al.[15], who found that the number of HHAs declined in states with HH CON while it grew in states without HH CON laws. Taken together, our studies suggest that HH CON limited the number of HHAs serving each area, which in turn drove up average caseloads.

The significant association of HH CON laws with lower per-patient costs might support our conjecture that there could be efficiencies resulting from reducing the travel time of home health workers between patients. Alternatively, limiting entry into the HHA market may increase the market power of existing HHAs and reduce their need to compete on quality. Thus, reduced costs could also be interpreted as undesirable reductions in service delivery. The latter argument is consistent with the findings of Ohsfeldt and Li[35], who find that HH CON laws are associated with lower HHA quality ratings.

Our empirical evidence that in the absence of HH CON laws, NH CON laws led to increased HHA caseloads suggests that among our sample HHAs, nursing homes might be more likely to have functioned as substitutes than as complements. This conclusion is similar to that of Miller et al., who found that NH CON laws were associated with higher Medicaid community-based care expenditures.[13] If so, the attenuation of the decrease in per-patient costs associated with HH CON laws when the state already had a NH CON law could have resulted because the “marginal” patients being referred from nursing homes were sicker.

Our finding that NH CON laws affected HHA caseloads and costs, presumably by reducing access to NH care, differs somewhat from the conclusions of Grabowski et al., who found that repealing NH CON laws had no significant impact on the sum of Medicaid NH and HHA expenditures.[12] However, these results cannot be directly compared, as we used a different time period, included both Medicare and Medicaid costs, controlled separately for HH CON laws and did not combine HHA and NH costs.

Our study has certain limitations. Our findings are unlikely to generalize to hospital-based HH agencies or those excluded due to low Medicare utilization. We have limited ability to distinguish the impact of HH CON laws alone from their effects when combined with NH CON laws. Finally, endogeneity bias due to omitted variables could be a concern if CON laws are correlated with unmeasured state- or market-level factors influencing HHA caseload and/or costs. Our models do adjust for important confounders and include random agency effects, but it was not possible for us to control for fixed state effects separately from CON laws, due to insufficient variation in CON laws over time within states during our study period. Fixed-effects models would have provided stronger controls for state-level

heterogeneity that might confound the estimates. However, the state-level characteristic most likely to be simultaneously correlated with CON laws and the outcomes is political climate; sensitivity analyses controlling for political climate measures yielded results that were at least as strong as those based on the original specification.

In summary, we have shown that both HH CON and NH CON laws have a significant impact on the HHA market, with effects on both caseload and costs. With regard to the fundamental question of whether these effects of CON laws are beneficial or detrimental, additional research is needed in order to study their implications for patient outcomes as well as total state budgets. If the lower per-patient costs associated with CON laws are not accompanied by adverse patient outcomes, then one potential benefit of CON laws could be allowing economies of scale to be better exploited. However, prior literature suggests that reduced costs are more likely due to HHAs having enough market power to shirk on quality[35].

Furthermore, the impact of CON laws on total HHA costs must be considered to assess their full policy impact. Despite the decline in per-patient costs, the disproportionate increases in per-agency caseload led to net increases in total costs, suggesting that increased market power may facilitate the ability of HHAs to induce demand for their services. In unadjusted analyses not shown here, states with CON laws had, as expected, slightly fewer agencies per capita, yet higher average HHA costs per state resident when aggregated across all agencies in the state. Although we cannot determine whether this association is causal, HH CON laws might have an adverse impact on public budgets even if these laws are associated with lower per-patient costs.

Thus CON laws provide an important policy lever for HH care. State policymakers deciding whether to impose (or rescind) CON regulations should carefully consider the impact relative to alternative methods of HHA cost containment, such as limiting the number of HH patients rather than agencies. A fruitful area for future research might be an investigation of the impact of CON on NH costs, as there may be potential trade-offs between NH and HHA costs.

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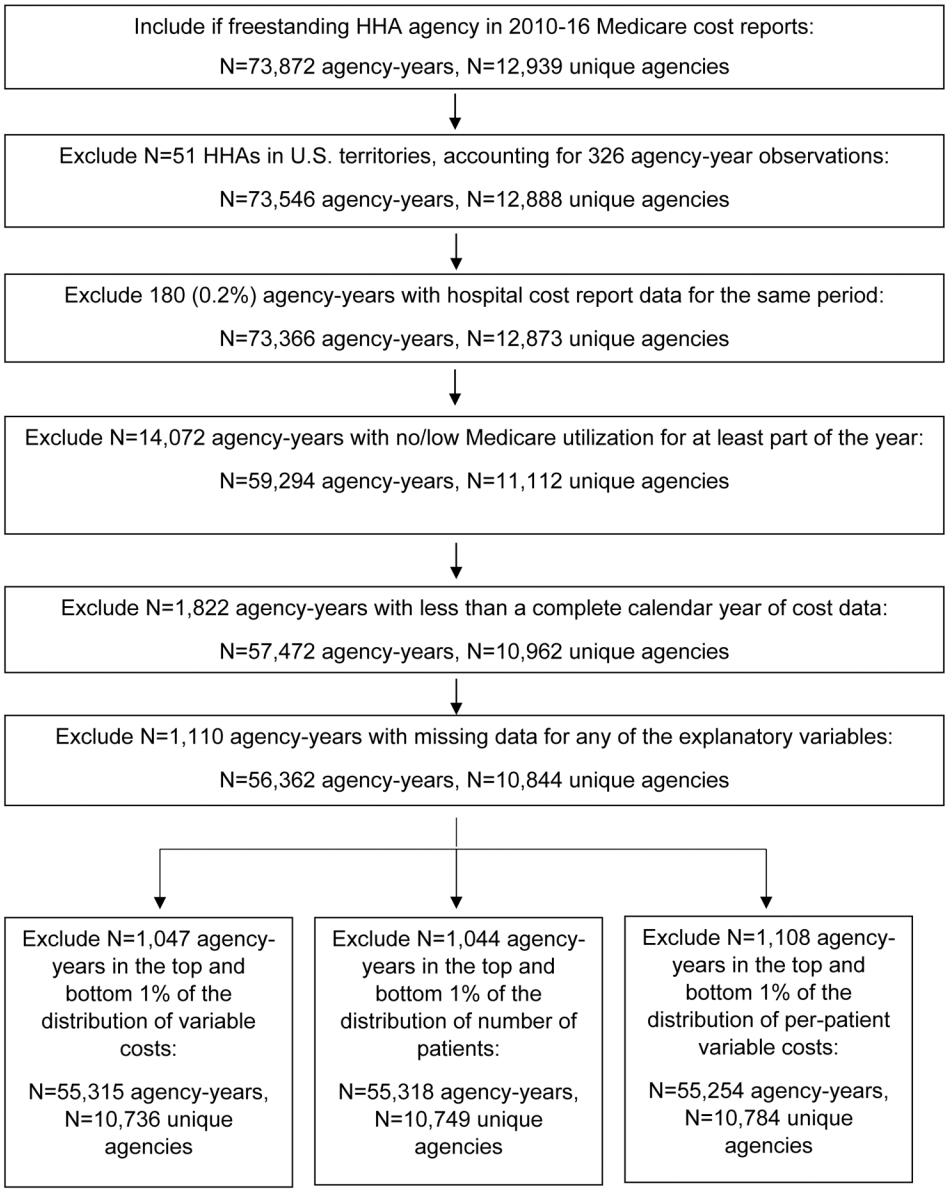

Figure 1.
Sample size flowchart

Table 1.

Characteristics of freestanding home health agencies from 2010-2016 Medicare Cost Reports (N=56,362 agency-years, corresponding to 10,844 unique agencies)

Variable	Mean	Std. Deviation	Median
Total variable costs	$2,533,132	$5,296,106	$1,274,939
Total number of (unique) patients	699	1,597	276
Total variable costs per (unique) patient	$5,963	$53,180	$4,409
Percent of patients on Medicare	0.75	0.26	0.82
Percent of year the agency was small (as defined in 42 CFR 413.24)	0.02	0.15	0.00
Proportion of year the agency was part of a chain	0.24	0.42	0.00
Proportion of year the agency was a not-for-profit	0.07	0.25	0.00
Proportion of year the agency had a contract for:			
Skilled nursing	0.41	0.49	0.00
HH aides	0.24	0.42	0.00
Physical therapy	0.87	0.33	1.00
Occupational therapy	0.73	0.44	1.00
Speech therapy	0.59	0.49	1.00
Average agency wage index	0.92	0.16	0.87
Average agency case-mix index *	1.17	0.30	1.13
Percent of the HHA's patients who live in rural zipcodes	16.54	22.65	5.26
Variable	**Percent**		
Whether the agency changed ownership	1%		
CON law(s) in effect in that state and year			
None	45%		
Home health CON only	1%		
Nursing home CON only	42%		
Home health and nursing home CON	12%		
Year of observation			
2010	14%		
2011	14%		
2012	15%		
2013	15%		
2014	15%		
2015	14%		
2016	13%		

* In the regressions, we used decile indicators instead of the continuous measure for reasons explained in the methods section above

Table 2.

Regression-adjusted associations of home health and nursing home CON laws with annual total variable costs, total number of unique patients and variable costs per unique patient

Predicted value for outcome in the hypothetical scenario with:	Total Variable Costs (N=55,315)	Total Number of Unique Patients (N=55,318)	Variable Costs Per Unique Patient (N=55,254)
a) No CON	$1,538,536	371	$5,292
b) HH CON only	$2,975,698	928	$4,072
c) NH CON only	$1,768,097	449	$5,021
d) Both HH CON and NH CON	$3,511,277	932	$4,857
Key comparisons:			
Effect of both laws vs. no CON (d – a)	***$1,972,741*** ***$\chi^2$ = 383.03 (p≤.001)***	***561*** ***χ^2 = 399.40 (p≤.001)***	***−$434*** ***$\chi^2$ = 44.05 (p≤.001)***
Effect of HH CON when NH CON = 0 (b – a)	***$1,437,161*** ***$\chi^2$ = 21.32 (p≤.001)***	***557*** ***χ^2 = 29.35 (p≤.001)***	***−$1,220*** ***$\chi^2$ = 133.38 (p≤.001)***
Effect of HH CON when NH CON = 1 (d – c)	***$1,743,180*** ***$\chi^2$ = 300.06 (p≤.001)***	***483*** ***χ^2 = 295.67 (p≤.001)***	***−$163*** ***$\chi^2$ = 6.71 (p≤.001)***
Effect of NH CON only when HH CON = 0 (c – a)	***$229,561*** ***$\chi^2$ = 62.80 (p≤.001)***	***78*** ***χ^2 = 87.68 (p≤.001)***	***−$271*** ***$\chi^2$ = 41.70 (p≤.001)***
Effect of NH CON when HH CON = 1 (d – b)	$535,579 χ^2 = 2.79 (p=.09)	4 χ^2 = 0.00 (p=.97)	***$786*** ***$\chi^2$ = 51.04 (p≤.001)***
Difference in effect of NH CON when HH CON = 1 vs. 0 *	$306,019 χ^2 = 0.90 (p=.34)	−74 χ^2 = 0.50 (p=.48)	***$1,056*** ***$\chi^2$ = 80.50 (p≤.001)***

Notes: Comparisons in bold italics are statistically significant at p≤.001. Sample excludes outliers (observations in the top and bottom decile). Estimates obtained using generalized linear models with log link and random effects for home health agency. Stata bases the χ^2 statistics and p-values for the marginal differences on first-order Taylor series expansions. Regressions also control for the percent of rural residents in the HHA's market area; percent of patients on Medicare; the proportions of the year when the agency was small (as defined by Medicare), part of a chain and/or not-for-profit; the proportions of the year the agency had contracts for skilled nursing, HH aides and physical, occupational and speech therapy; whether the agency had changed ownership; year of observation; indicators for the decile of average case-mix index in the observation year; and average agency wage index.

* The difference in the effect of HH CON when NH CON = 1 vs. 0 is the same as the difference in the effect of NH CON when HH CON = 1 vs. 0 [(a + d) − (b + c)].