FINAL

Evaluation of the Medicare Prior Authorization Model for Repetitive Scheduled Non-Emergent Ambulance Transport: Second Interim Evaluation Report

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ACRONYMS

CHIP	Children's Health Insurance Program
CMS	Centers for Medicare & Medicaid Services
DHHS	Department of Health and Human Services
ESRD	End-Stage Renal Disease
FFS	Fee-for-Service
HCC	Hierarchical Condition Category
MAC	Medicare Administrative Contractor
MACRA	Medicare Access and CHIP Reauthorization Act of 2015
NPI	National Provider Identifier
NPPES	National Plan and Provider Enumeration System
PAR	Prior Authorization Requests
PECOS	Provider Enrollment, Chain, and Ownership System
RSNAT	Repetitive Scheduled Non-Emergent Ambulance Transport
RSNAT-PA	RSNAT Prior Authorization
SNF	Skilled Nursing Facility

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EXECUTIVE SUMMARY

Overview

In December 2014, the Centers for Medicare & Medicaid Services (CMS) launched the Medicare Prior Authorization Model for Repetitive, Scheduled, Non-Emergent Ambulance Transport (RSNAT-PA) in selected states where expenditures for these services were high compared to other states. The model uses prior authorization to reduce ambulance transports that do not meet the Medicare criteria. The goal is to test whether prior authorization can decrease Medicare expenditures without affecting beneficiaries' access to or quality of care. Implementation of the model began in New Jersey, Pennsylvania, and South Carolina (hereafter referred to as Year 1 states). In January 2016, CMS added five more states (Delaware, Maryland, North Carolina, Virginia, and West Virginia) and the District of Columbia (hereafter referred to as Year 2 states). The model is currently scheduled to run until December 1, 2020.

RSNAT-PA intends to reduce improper service utilization and expenditures by subjecting RSNAT requests to Medicare Administrative Contractor (MAC) review. The MAC review ensures that the requests comply with documentation and coverage rules (including medical necessity) before claims are submitted for payment. RSNAT-PA requires suppliers with ambulances garaged in the model states to obtain prior authorization for RSNAT services from their MAC, or else be subject to Medicare's prepayment review process. If RSNAT-PA works as intended, we expect RSNAT utilization and expenditures to decrease, and total Medicare expenditures may also decrease.

In May 2015, CMS contracted with Mathematica to evaluate RSNAT-PA. The goal of the evaluation is to assess the impact of RSNAT-PA on RSNAT utilization and expenditures, as well as quality of and access to care. Our evaluation examines the impact of RSNAT-PA among beneficiaries with chronic conditions that are associated with use of RSNAT services—end-stage renal disease (ESRD) and/or severe pressure ulcers. Because RSNAT use is uncommon among Medicare beneficiaries, we focus on this subset of beneficiaries who are more likely to use RSNAT services. This enables us to better detect the impact of the model. Beneficiaries with ESRD and/or pressure ulcers account for about 85 percent of all RSNAT claims, although even within this group the average probability of receiving an RSNAT service in a calendar quarter is only 4 percent.

In this report, we cover four years of experience in the Year 1 states and three years in the Year 2 states.

Results

Our results suggest that RSNAT-PA reduced RSNAT use and expenditures for beneficiaries with ESRD and/or pressure ulcers. Total Medicare fee-for-service (FFS) expenditures decreased in the full study population and for beneficiaries with ESRD, although they increased for beneficiaries with pressure ulcers only. Overall, our results suggest that the model had no adverse effects on quality of care or access to care. We found no increase in emergency department use,

hospitalization, or death among model state beneficiaries relative to comparison state beneficiaries. While we saw some small changes in dialysis use among beneficiaries with ESRD, we found no evidence of reduced access to care resulting in increased hospitalization for complications of ESRD.

In Table ES.A, we summarize key results from the evaluation.

Table ES.A. Second Interim Evaluation Report findings, by research domain

Objective 1: Utilization and expenditures
• RSNAT-PA reduced RSNAT use and expenditures by over **60 percent** in model states for beneficiaries with ESRD and/or pressure ulcers, representing approximately **$550 million in RSNAT-related savings**.
• Both Year 1 and Year 2 cohort states experienced these reductions, but the magnitude of these reductions was generally much larger for the Year 1 states, which had higher levels of pre-model RSNAT use.
Objective 2: Quality of care and access to care
• The model found no evidence that RSNAT-PA had an adverse impact on quality of or access to care for beneficiaries with ESRD and/or pressure ulcers.
Objective 3: Suppliers
• The number of RSNAT suppliers per 100,000 FFS beneficiaries in Year 1 states **decreased by about half** when RSNAT-PA went into effect.
• Suppliers that were heavily dependent on RSNAT payments were more likely to leave the market.
Objective 4: Claims denials
• The claims denial rate rose immediately upon implementation of RSNAT-PA, but within eight quarters it decreased back toward the baseline rate (the rate before implementation).

Conclusions

Over the first four years of model implementation for the Year 1 states and the first three years for the Year 2 states, RSNAT-PA had a dramatic impact. For beneficiaries with ESRD and/or pressure ulcers, the model led to reductions in RSNAT use and expenditures—and in total Medicare expenditures. These reductions did not have any meaningful impacts on beneficiaries' access to care or quality of care, and they appeared to drive suppliers to exit the market primarily if the suppliers were heavily dependent on RSNAT.

Although RSNAT utilization and expenditures declined in both Year 1 and Year 2 states, the impacts were considerably smaller for the Year 2 states ($121 versus $440 per beneficiary per quarter), which had lower baseline RSNAT use. These findings are similar to those we observed in the First Interim Evaluation Report, which was based on two years of experience in the Year 1 states and one year in the Year 2 states.

Our findings suggest that expanding RSNAT-PA nationwide could produce savings for Medicare. That said, we believe these savings would be smaller than those estimated in this report. Given that CMS initially chose model states with particularly high baseline rates of RSNAT use, the findings here may not generalize to states that have more moderate rates of RSNAT use. We believe the smaller savings realized for the Year 2 states provide a better estimate of the potential savings that Medicare might achieve under a national prior authorization program.

Although additional years of experience with the model have the potential to place beneficiaries at increased risk of an adverse event, we did not observe meaningful impacts on quality of or access to care. At this point in time, these findings suggest that a national prior authorization program would likely not generate adverse impacts for beneficiaries. It will be important to assess whether any such impacts are observed in the future when the model has been in effect for longer.

Our supplier analysis suggests that ambulance suppliers in the Year 1 model states might have depended more heavily on RSNAT for their revenue than suppliers in other states. As a result, the pattern we observed of suppliers exiting the market in these states might not generalize to other states or to the rest of the Medicare program. As with the beneficiary utilization and expenditure results, the findings for Year 2 state suppliers could provide a more reliable guide to what might occur if CMS extended prior authorization to more states.

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I. INTRODUCTION

On November 14, 2014, the Centers for Medicare & Medicaid Services (CMS) announced the implementation of a Medicare prior authorization model for repetitive scheduled non-emergent ambulance transports (RSNAT-PA). The model was initially implemented in selected states that had a high rate of improper payments for these services to ambulance suppliers.[1] Phase I of the model began in December 2014 in New Jersey, Pennsylvania, and South Carolina (hereafter referred to as Year 1 states). In January 2016, Phase II added five more states (Delaware, Maryland, North Carolina, Virginia, and West Virginia) and the District of Columbia (hereafter referred to as Year 2 states) to the RSNAT-PA model as mandated in the Medicare and CHIP Reauthorization Act of 2015 (MACRA). CMS's purpose for the model was to test whether prior authorization helps reduce fraud, abuse, and associated expenditures while maintaining access to and quality of care.

In this Second Interim Evaluation Report, we present findings from analyses of quantitative data from all eight model states and the District of Columbia (hereafter referred to as the nine model states). Our findings include estimates of selected impacts of the RSNAT-PA model during its first four years.

Background

Prior Authorization

Prior authorization is a utilization management strategy intended to reduce improper payments. Providers must request approval from health care payers for services they intend to provide before they can bill for the services. Payers can thus review service requests for compliance with coding, billing, and coverage rules (including medical necessity) before the services are provided or reimbursed. Prior authorization is designed to increase compliance with coverage rules and help contain expenditures, and reduce waste, fraud, and abuse. Private sector health care payers (TRICARE 2016; American Medical Association 2013) and other government health care payers including Medicare Part D pharmaceutical plans (DHHS 2015) already use prior authorization. Research indicates that such policies can be effective in reducing expenditures for the related service or benefit (MacKinnon and Kumar 2001).

A CMS demonstration involving prior authorization for power mobility devices showed a large decrease in monthly expenditures for included devices (CMS 2014a). This finding caused CMS to make prior authorization a condition of payment by adding 31 items to the Required Prior Authorization List of Durable Medical Equipment, Prosthetics, Orthotics, and Supplies.[2] This finding caused CMS to make prior authorization a condition of payment for certain items of

[1] Under Medicare, ambulance *suppliers* are freestanding entities. Hospital-based ambulance service entities (or *providers*) are exempt from the prior authorization model.

[2] See https://www.cms.gov/Research-Statistics-Data-and-Systems/Monitoring-Programs/Medicare-FFS-Compliance-Programs/DMEPOS/Downloads/DMEPOS_PA_Required-Prior-Authorization-List.pdf.

Durable Medical Equipment, Prosthetics, Orthotics, and Supplies that are frequently subject to unnecessary utilization.[3] A CMS model involving prior authorization for hyperbaric oxygen therapy when used to treat certain non-emergent conditions also found that prior authorization decreased expenditures (Asher et al. 2019). However, that model did not result in a change to Medicare reimbursement policy.

RSNAT

RSNAT is defined as medically necessary transportation by ambulance that occurs three times or more during a 10-day period or at least once per week for three weeks or longer. Common destinations for Medicare beneficiaries who require RSNAT include dialysis treatment and treatment of non-healing wounds such as debridement, dressing changes, and hyperbaric oxygen therapy. RSNAT is a covered service under Medicare Part B, as long as the recipient beneficiary meets certain criteria—such as being confined to bed or otherwise medically requiring the level of service provided by an ambulance (CMS 2014c).

Audits of Medicare claims and medical records have revealed large numbers of improper payments for RSNAT services. A 2015 report from the Office of the Inspector General, U.S. Department of Health and Human Services (DHHS), found that, in the first half of 2012, Medicare paid $24 million for ambulance transports that did not meet Medicare requirements and an additional $30 million for transports that did not correspond to any Medicare services received at the origin or destination (DHHS 2015). That report followed a 2006 report stating that 25 percent of ambulance transports reimbursed in 2002 did not meet Medicare's requirements for coverage; a large share of those reimbursements were improper payments for transport to dialysis or other non-emergency transport (DHHS 2006). Despite consistent evidence that large percentages of RSNAT claims do not meet Medicare's coverage criteria, high rates of improper payments persist (CMS 2014b, 2014c). Also, ground ambulance transport service use grew by 33 percent from 2004 to 2010 (GAO 2012).

In July 2013, concerns about high risk of fraud, waste, or abuse associated with RSNAT claims in certain parts of the country led CMS to impose a moratorium on new ambulance suppliers in several areas (42 CFR §424.570(c); CMS 2016c). The moratorium prohibited new ambulance suppliers in Harris County, Texas, and surrounding counties, as well as in Philadelphia, Pennsylvania, and surrounding counties (including Burlington, Camden, and Gloucester counties in New Jersey) from enrolling in Medicare Part B. CMS extended the moratorium to prohibit any new non-emergency ambulance suppliers in Texas, Pennsylvania, and New Jersey from enrolling in Medicare Part B as of July 29, 2016 (CMS 2016b).

RSNAT-PA Model

RSNAT-PA aims to lower improper Medicare fee-for-service (FFS) use and spending while maintaining quality of care by curtailing proposed RSNAT use that is insufficiently documented

[3] See CMS 6050-F- https://www.govinfo.gov/content/pkg/FR-2015-12-30/pdf/2015-32506.pdf.

and reinforcing the Medicare medical necessity requirement. The medical necessity requirement has been in place since before the model started but suppliers and certifying physicians often misunderstand and misapply it. However, there is a risk that prior authorization may result in some beneficiaries experiencing a delay in receiving needed care (Bergeson 2013).

In December 2014, CMS began RSNAT-PA for ambulance suppliers based in the Year 1 states, which had high rates of utilization and improper payment. Under Section 515 of the Medicare Access and CHIP Reauthorization Act of 2015 (MACRA; CHIP is the Children's Health Insurance Program), CMS added the six Year 2 states to the model in January 2016. The model is scheduled to run until December 1, 2020, in all participating states, with the potential for future nationwide expansion or extension within the participating states. Under RSNAT-PA, if ambulance suppliers fail to seek prior authorization for billed services, their claims are subject to automatic prepayment review. Under prepayment review, a provider's claims are marked pending and are not paid until they have been verified.[4] This review usually focuses on a small proportion of claims that stand out to reviewers because the providers or suppliers have a history of improper payments or other irregularities. However, because of this automatic prepayment review process in model states, suppliers that did not request prior authorization for RSNAT services are subject to prepayment review and could not evade scrutiny for medical necessity and appropriate use.

Evaluation overview

This evaluation assesses the impact of the RSNAT-PA model on beneficiaries, suppliers, and the Medicare program. The evaluation has five objectives:

1. Estimate the impact of prior authorization on the volume of RSNAT services delivered and on Medicare expenditures.
2. Assess whether and how prior authorization affects beneficiaries' quality of care and access to care.
3. Evaluate the effect of the model on suppliers, particularly their choice of whether to remain in the Medicare program.
4. Assess whether prior authorization has an impact on the rate of claims denials.
5. Assess feasibility of national implementation and draw implications from findings.

Table I.1 presents the evaluation research questions, which we address in this report.

[4] As part of this verification, supporting documentation is reviewed to ensure billed services meet Medicare coverage, billing, and coding requirements prior to being paid.

Table I.1. Evaluation research questions

Research questions
Objective 1: RSNAT service utilization and Medicare expenditures **How does the prior authorization model affect Medicare service use and expenditures?**
How does prior authorization affect: • RSNAT service use and total Medicare ambulance service use? • Total expenditures for RSNAT services and for total Medicare ambulance services? • Total Medicare expenditures?
Objective 2: Quality of care and access to care **How does the prior authorization model affect quality of and access to care (including service use that indicates access issues)?**
Does prior authorization affect: • Emergency department and emergency ambulance use? • Unplanned inpatient hospitalizations? • Mortality? • Whether beneficiaries experience a delay in services? • Whether beneficiaries experience lower use of dialysis?
Objective 3: Suppliers **How does the prior authorization model affect suppliers' behavior?**
What was the impact of the model on suppliers' decision to remain in the Medicare program? • Did the number of suppliers that operated in the market change after prior authorization? • How did suppliers that exited around the start of prior authorization differ from those that stayed?
Objective 4: Claims denials **How does the prior authorization model affect claims denial rates?**
• Does prior authorization affect claims denial rates?
Objective 5: Feasibility and implications from findings **How feasible is expanded or national prior authorization for RSNAT?**
• What results might be expected from a nationally expanded RSNAT prior authorization policy? • What external factors, circumstances, or aspects of the model might limit its ability to realize savings in the case of national implementation? • What would enhance the model's ability to realize savings?

Mathematica conducted quantitative data analysis of Medicare claims data to address the above objectives. We constructed a comparison group of states similar to the model states and performed analyses at the beneficiary and supplier levels. We conducted both descriptive analyses and multivariate analyses (that is, using multiple independent variables) of key outcomes. We examined (1) intended outcomes, such as changes in the volume of RSNAT services and total ambulance utilization and expenditures, as well as (2) unintended outcomes, including impacts on quality of care and access to care. Chapter II provides more detail about the analytic methods we used.

II. METHODS

We identified a group of comparison states, used descriptive analysis to examine how the model and comparison states differed on key outcomes in our study, and used multivariate regression analysis to estimate the effect of RSNAT-PA on each outcome.

Study period and data

Our study covers the period from January 2012 through December 2018. We therefore have three years before and four years after the model start for the Year 1 states, and four years before and three years after the model start for the Year 2 states. We compare how the model states change relative to the comparison states as a group over this time period.[5] Throughout this report, we refer to the pre-model years as the baseline period. We used final action claims for Medicare FFS beneficiaries for dates of service in our study period, excluding duplicate and denied claims.[6]

Study population

States

The states CMS selected for the first year of the model were chosen for their high utilization of ambulance services and high improper payment rates. In contrast, the second-year states were identified in the MACRA law (U.S. Congress 2015) and their ambulance use was closer to the national average. The substantial differences between the Year 1 states and the Year 2 states presented a challenge for choosing a valid comparison group. It is important for the validity of our analytic approach that the comparison group is made up of beneficiaries and suppliers from states with similar pre-model utilization patterns to the model states. To address this challenge, we used a statistical matching technique that is designed to select a group of states as similar as possible to the model states on a range of characteristics.

We matched the model states with potential comparison states. Each model state could be matched with up to two comparison states.[7] We made no distinction between the Year 1 and Year 2 states when matching. This approach resulted in optimal balance for our main analyses, which combined the Year 1 and Year 2 model states. We matched on RSNAT utilization, availability of ambulance suppliers, and rural residence. Matching on rural residence was important because we expect prior authorization to affect urban and rural areas differently, given that rural areas have a more limited ambulance supply and fewer transportation alternatives.

[5] We do not examine the impact on individual states.

[6] For all included quarters, we allowed at least three months after the quarter end date for claims to be processed, resulting in at least 84 percent final action inpatient claims and at least 91 percent final action outpatient and professional service claims. In previous reports, we had longer runout, but for this analysis, we decided to include data for dates of service for the entire 2018 calendar year. This decision enabled us to use a full calendar year of claims to construct Hierarchical Condition Category (HCC) flags for sample inclusion and HCC scores for regression control. See the Glossary for more details about HCC flags and HCC scores.

[7] The ratio of model to comparison states in matched groups ranged from 1/2 to 2.

Table II.1 lists the comparison states.[8] More information on our comparison group selection is included in Appendix A.

Table II.1. Model and matched comparison states

Model states (Year 1 states in bold)	Matched comparison states[a]
Delaware	Alabama
Maryland	Florida
New Jersey	Georgia
North Carolina	Indiana
Pennsylvania	Kentucky
South Carolina	Louisiana
Virginia	Massachusetts
West Virginia	Montana
Washington, DC	Nebraska
	Ohio
	Tennessee
	Texas
	Washington

[a] In the analysis, we compare the overall group of model states, as well as each model cohort (Year 1 or Year 2 states) to the entire set of comparison states.

Beneficiaries

We conducted the beneficiary analysis at the beneficiary-quarter level. We included a beneficiary-quarter if the beneficiary was enrolled in FFS Medicare for at least part of the quarter and was living in one of the included states (Year 1, Year 2, or comparison states). We excluded beneficiaries who moved between model and comparison states during the study period, to avoid contaminating either group.

Because non-emergency ambulance service use is relatively rare in the Medicare population, we limited our study population to beneficiaries with end-stage renal disease (ESRD) and/or stage 3 or 4 pressure ulcers.[9] During the study period, over 85 percent of RSNAT users in our intervention and comparison states were beneficiaries with ESRD and/or pressure ulcers. Restricting to beneficiaries with these conditions enabled us to examine RSNAT use among the beneficiaries who are most likely to use RSNAT, and therefore improved our ability to detect

[8] For the comparison group, we used the start date for Year 1 states for Georgia, Indiana, and Tennessee, and the Year 2 start date for the remaining comparison states.

[9] Pressure ulcers, also called decubitus ulcers or bedsores, are localized damage to the skin (and possibly the underlying tissue) that usually occur over a bony prominence as a result of pressure or a combination of pressure and friction. We included the most severe forms—pressure ulcer of skin with full thickness skin loss (stage 3) and pressure ulcer of the skin with necrosis through to muscle, tendon, or bone (stage 4).

impacts.[10] We identified beneficiaries with these conditions using Hierarchical Condition Category (HCC) flags, which are constructed using claims data.[11] Information on our selection of these conditions is included in Appendix B.

Although both ESRD and pressure ulcers are associated with increased RSNAT use, they are very different conditions. These conditions have different implications for frequency of RSNAT use as well as for use of other health care services. For example, beneficiaries with ESRD had a much higher likelihood of using RSNAT in the baseline period, especially in the Year 1 states (Table II.2). Beneficiaries with both ESRD and pressure ulcers had a utilization rate over three times higher than the rate for beneficiaries with ESRD only. Therefore, in addition to analyzing the full study sample of beneficiaries with either or both of these conditions, we also considered outcomes for the three possible combinations of these chronic conditions: (1) ESRD only, (2) pressure ulcers only, and (3) ESRD and pressure ulcers.

Table II.2. RSNAT utilization rate in baseline period, by cohort and chronic condition

	Percentage of beneficiaries who used RSNAT in baseline period[a]		
	Year 1 cohort	Year 2 cohort	Comparison
Full sample	10.1%	4.7%	4.9%
ESRD only	3.5%	5.7%	6.0%
Pressure ulcers only	2.9%	2.3%	2.1%
ESRD and pressure ulcers	49.4%	24.7%	29.0%

[a]The baseline period includes 2012–2014 for Year 1 states and 2012–2015 for Year 2 states.

ESRD = end-stage renal disease; RSNAT = repetitive scheduled non-emergent ambulance transport.

We used a statistical weighting technique that is designed to balance the characteristics of the beneficiaries living in the comparison states with those living in the model states. After applying the weights, beneficiaries in comparison states were similar on average to those in model states on nearly all of the baseline demographic and health characteristics we examined, indicating that we achieved good balance between the groups. The exception is that a higher proportion of comparison beneficiaries were dually eligible for Medicare and Medicaid. Balance on beneficiary characteristics is shown in Table C.3 in Appendix C.

Our final study population consisted of 540,392 beneficiaries who resided exclusively in model states and 1,012,173 beneficiaries who resided exclusively in comparison states. Fifty-six percent of included beneficiaries had ESRD only, 42 percent had pressure ulcers only, and 2 percent had both conditions. The length of time that each beneficiary was part of our sample ranged from 1 to

[10] We removed less than 15 percent of the beneficiaries on this basis; excluding them helps avoid bias in the estimated impacts because they might have markedly different characteristics or a dramatically different response to the model than beneficiaries who would likely be affected by RSNAT-PA.

[11] The ESRD groups included in this study were HCC 134 and HCC 136; the pressure ulcer groups were HCC 157 and HCC 158.

28 quarters, with a mean duration of 7.6 quarters for model-only beneficiaries and 7.7 quarters for comparison-only beneficiaries. We had a total of 11,883,591 beneficiary-quarters.

Suppliers

We identified suppliers from carrier claims based on National Provider Identifier (NPI) and provider state codes.[12] Our study population consisted of all nonhospital-based ambulance suppliers garaged in any of the model or comparison states that billed Medicare for ambulance services in any quarter of our study period. The population included 3,093 model state suppliers and 5,146 comparison state suppliers.

Outcome measures

The outcome measures for each of our research questions are included in Table II.3. Information on how the measures were constructed is included in Appendix B.

Table II.3. RSNAT evaluation outcome measures

Research question	Outcome measures
How does the prior authorization model affect Medicare service use and expenditures?	• Whether the beneficiary used RSNAT ambulance • Number of RSNAT ambulance trips • Whether used any ambulance • Total number of ambulance trips • RSNAT expenditures[13] • All ambulance expenditures • Total Medicare FFS expenditures
How does the prior authorization model affect quality of and access to care (including service use that indicates access issues)?	*For all beneficiaries:* • Whether had emergency department visit • Number of emergency department visits • Whether had emergency ambulance trip • Number of emergency ambulance trips • Whether had unplanned inpatient admission • Whether died *For beneficiaries with ESRD:* • Whether had scheduled dialysis • Number of days of scheduled dialysis • Average number of days between scheduled dialysis • Whether had emergency dialysis • Number of emergency dialysis treatments • Whether had hospitalization for ESRD complications • Number of hospitalizations for ESRD complications
How does the prior authorization model affect suppliers' behavior?	• Billing Medicare for ambulance services (the absence of billing after a defined point in time suggests the supplier exited the Medicare program)

[12] If the provider state code indicated any of the model or comparison states, we matched the corresponding NPI with the National Plan and Provider Enumeration System (NPPES) file to verify the location of the supplier. We excluded three suppliers whose NPI numbers were invalid or who, when matched to the NPPES file, we determined were not garaged in a model or comparison state.

[13] RSNAT expenditures include mileage claims using codes A4025.

Research question	Outcome measures
How does the prior authorization model affect claims denial rates?	• Number of denied non-emergency ambulance claims

ESRD = end-stage renal disease; RSNAT = repetitive scheduled non-emergent ambulance transport.

Analytic approach

We conducted a quantitative evaluation, using a combination of descriptive and multivariate analyses to address the research questions in Chapter I. The data processing for this report was done using SAS software, Version 7.15 of the SAS system for Windows Copyright © [2017] SAS Institute Inc.[14] All regressions were conducted in Stata 15.[15]

Descriptive analyses

We conducted descriptive analyses to understand changes in the following outcomes after implementation of RSNAT-PA:

- RSNAT utilization and expenditures;
- Suppliers entering and/or exiting the Medicare program.

RSNAT utilization and expenditures: We considered two measures, both per beneficiary per quarter:

1. The probability of having an RSNAT service. A trip is considered RSNAT if it is non-emergent and occurs as part of a sequence of trips that satisfies the model definition of RSNAT; and
2. Payments to suppliers for RSNAT services.

These descriptive analyses do not adjust for potentially confounding factors[16] and were not used to support conclusions about the prior authorization model. However, they provide summary information on changes in utilization and expenditures, setting the stage for more in-depth analyses.

Suppliers entering and/or exiting the Medicare program:
We also conducted descriptive analyses of supplier exit. Because the types and quality of

[14] SAS and all other SAS Institute Inc. product or service names are registered trademarks or trademarks of SAS Institute Inc., Cary, NC, USA.

[15] StataCorp. Stata Statistical Software: Release 15. College Station, TX: StataCorp LLC, 2017.

[16] Confounding factors (such as age, health status, and chronic condition) can distort the observed association between study group and outcomes if the different study groups look different on those factors.

supplier data available to us were limited,[17] we relied on descriptive data analysis to address the question of whether the model influenced supplier exit from the Medicare program. We first measured the number of Medicare Part B ambulance suppliers per 100,000 FFS beneficiaries. We then considered the subset of suppliers who billed Medicare Part B before the model was implemented. We divided the subset into three groups:

1. Stayers, who billed Medicare in at least two years after the model was implemented;
2. Triers, who billed Medicare in the first year after implementation, but not after that;[18]
3. Leavers, who did not bill Medicare at any point after model implementation.

To determine the characteristics of the beneficiary population served by each supplier, we attributed beneficiaries to suppliers based on "catchment areas." A supplier's catchment area consists of the set of zip codes in which that supplier's Medicare customers reside. We compared stayers, triers, and leavers on the characteristics of their customer base as well as on service provision and payments received in the year before implementation. The comparisons enabled us to comment on which suppliers were more likely to leave the market after RSNAT-PA took effect.

Multivariate analyses

We conducted multivariate analysis to understand the impacts of RSNAT-PA on beneficiaries and on denied claims. Our analysis consisted of estimating multivariate regressions using a difference-in-differences approach. Difference-in-differences analysis compares changes in outcomes between baseline and follow-up in the model states to changes in outcomes over the same time frame in the comparison states, controlling for any long-term trends. Its goal is to isolate the impact of the RSNAT model. The difference-in-differences analysis controls for unmeasured, beneficiary- and state-level characteristics that do not change over time and might be related to our outcomes. It also removes the influence of confounding factors and makes our estimates more precise.

Assumptions for causality. Under some assumptions, estimates from the difference-in-differences approach can be interpreted as the impacts that RSNAT-PA caused. First, we assume that trends in outcomes in the model and comparison states were parallel before the model start date. This assumption is needed to ensure that the comparison group is an appropriate counterfactual for the model states (that is, the changes in outcomes from the baseline period to the follow-up period for the comparison states are the same as the changes in outcomes that would have occurred for the model states if RSNAT-PA had not been implemented). We found

[17] Neither Medicare Provider Enrollment, Chain, and Ownership System (PECOS) nor National Plan and Provider Enumeration System (NPPES) data contained analytic data of sufficient quality for ambulance suppliers other than contact and location information. As a result, we were unable to use these data in the analysis.

[18] We added the triers category for this report. Previous reports included only leavers and stayers, where stayers included suppliers who billed at any point after model implementation. We divided this group to assess how often suppliers continued to bill Medicare for a short time after model implementation before concluding that they should leave the Medicare program.

that this assumption was met—plots of the quarterly trends in key outcomes in model and comparison states revealed very similar patterns during the three- or four-year pre-model period. Second, we assume the types of beneficiaries in the study population did not change over the study period. This assumption is likely satisfied in our analyses. The diagnoses given by clinicians, Medicare demographic characteristics, and rates of chronic conditions in model and comparison states are unlikely to change systematically over time. Hence, including beneficiaries based on their diagnosed chronic conditions results in a stable population over our study period. Finally, we assume there were no other changes in the policy environment that could affect our outcomes of interest differently in the model and comparison states.

Subgroups. RSNAT-PA could have different impacts on rural and non-rural beneficiaries due to differences in transportation options. We therefore divided our study population by beneficiaries' type of residential area (rural or non-rural) and repeated our analyses to see if the model affected one subgroup more than the other. Similarly, we divided the study population by dual eligibility for Medicare and Medicaid. Beneficiaries who qualify for Medicaid have worse health and lower income on average than those who do not, both of which might influence the need for RSNAT. We also repeated our analysis on the group of beneficiaries who had claims indicating a hospital bed had been placed in their home. We used a hospital bed claim as a proxy (or indicator) for being bedbound, which could indicate a subgroup of beneficiaries more likely to qualify for RSNAT services.

The appendices provide additional detail on our analytical methods. In Appendix A, we describe the comparison group selection methodology and results. In Appendix B, we discuss our quantitative analytic approach for both beneficiaries and suppliers. We used the same multivariate methods to address all the research questions. Appendices C and D describe beneficiary balance and supplier matching, respectively. Appendix E provides supplementary results tables. Appendices F and G provide statistical power calculations for utilization and expenditure measures.

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III. RESULTS

In this chapter, we examine the impact of RSNAT-PA on (1) utilization and expenditures, (2) quality of and access to care, (3) suppliers, and (4) claims denials. Our findings cover the first 48 months of the model for beneficiaries with ESRD and/or pressure ulcers. We compare outcomes in the model states during the performance period to outcomes before the model start date. Then we compare these changes to changes in outcomes over the same time frame in the comparison states. We organize the chapter by the study's research objectives.

Key Findings

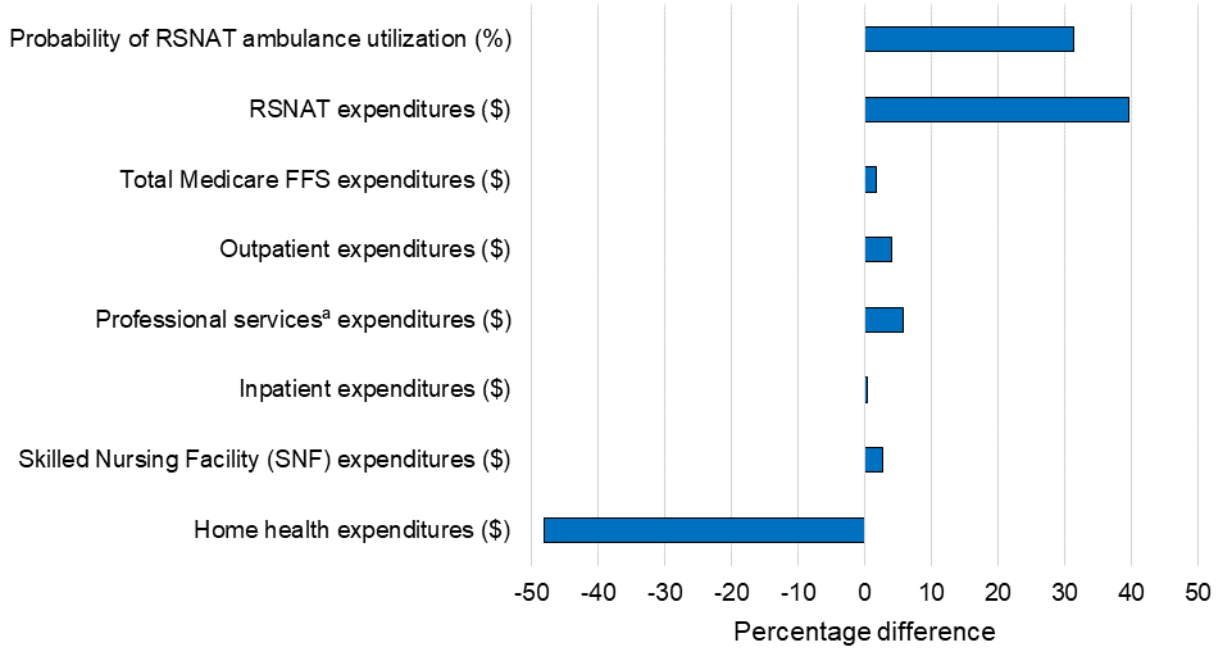
- RSNAT utilization and expenditures decreased by over 60 percent among beneficiaries with ESRD and/or pressure ulcers
- The model did not appear to cause serious adverse outcomes, but did drive changes in utilization of services other than RSNAT
  - We found a slight reduction in scheduled dialysis use and a slight increase in emergency dialysis use among beneficiaries with ESRD
  - We found a reduction in emergency department use and unplanned hospitalizations, and no impact on mortality
- Ambulance suppliers that depended heavily on RSNAT exited the market when the model started, particularly in Year 1 states

Objective 1: Utilization and expenditures

Before the model was implemented, beneficiaries with ESRD and/or pressure ulcers in model states had higher quarterly utilization of and expenditures for ambulance services. RSNAT utilization was over 30 percent higher and expenditures were nearly 40 percent higher (Figure III.1). This difference is by design—CMS selected the states with the highest rates of RSNAT use for RSNAT-PA (Year 1 states). Other than expenditures related to RSNAT, the composition of baseline total expenditures was comparable between the model and comparison states with one exception: model states had much lower home health expenditures than comparison states.[19] Home health services typically require a beneficiary to be homebound, which is similar to the RSNAT requirements. The fact that model states had lower home health expenditures and yet higher RSNAT expenditures reinforces the likelihood that RSNAT was overused in the model states before implementation. The similarity on most other types of expenditures suggests that the model state beneficiaries were not simply heavy users of health care in general, rather that their use of RSNAT was unusually high.

[19] The difference arose primarily from a greater proportion of comparison state beneficiaries having any home health expenditures (18 percent versus 13 percent in model states). Among beneficiaries with any expenditures in a quarter, expenditure amounts were similar between model ($3,400) and comparison states ($3,600).

Figure III.1. Percentage differences in baseline utilization and expenditures between model and comparison states



Note: Figure shows percentage difference in baseline utilization and expenditures between model and comparison states. The baseline period is 2012–2014 for Year 1 states and 2012–2015 for Year 2 states. Bars to the right of the 0-axis represent greater utilization/expenditures in the model states; bars to the left of the 0-axis represent lower utilization/expenditures in the model states. Utilization and expenditures are measured per beneficiary per quarter. Comparison group individuals are weighted to resemble model state individuals on baseline demographic and health characteristics. The model states were Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, South Carolina, Virginia, West Virginia, and the District of Columbia. The comparison states were Alabama, Florida, Georgia, Indiana, Kentucky, Louisiana, Massachusetts, Montana, Nebraska, Ohio, Tennessee, Texas, and Washington.

[a] Professional services providers include physicians, physician assistants, clinical social workers, and nurse practitioners, as well as some organizational providers such as independent clinical laboratories, ambulance providers, free-standing ambulatory surgical centers, and free-standing radiology centers.

FFS = fee-for-service; RSNAT = repetitive scheduled non-emergent ambulance transport.

Descriptive analysis

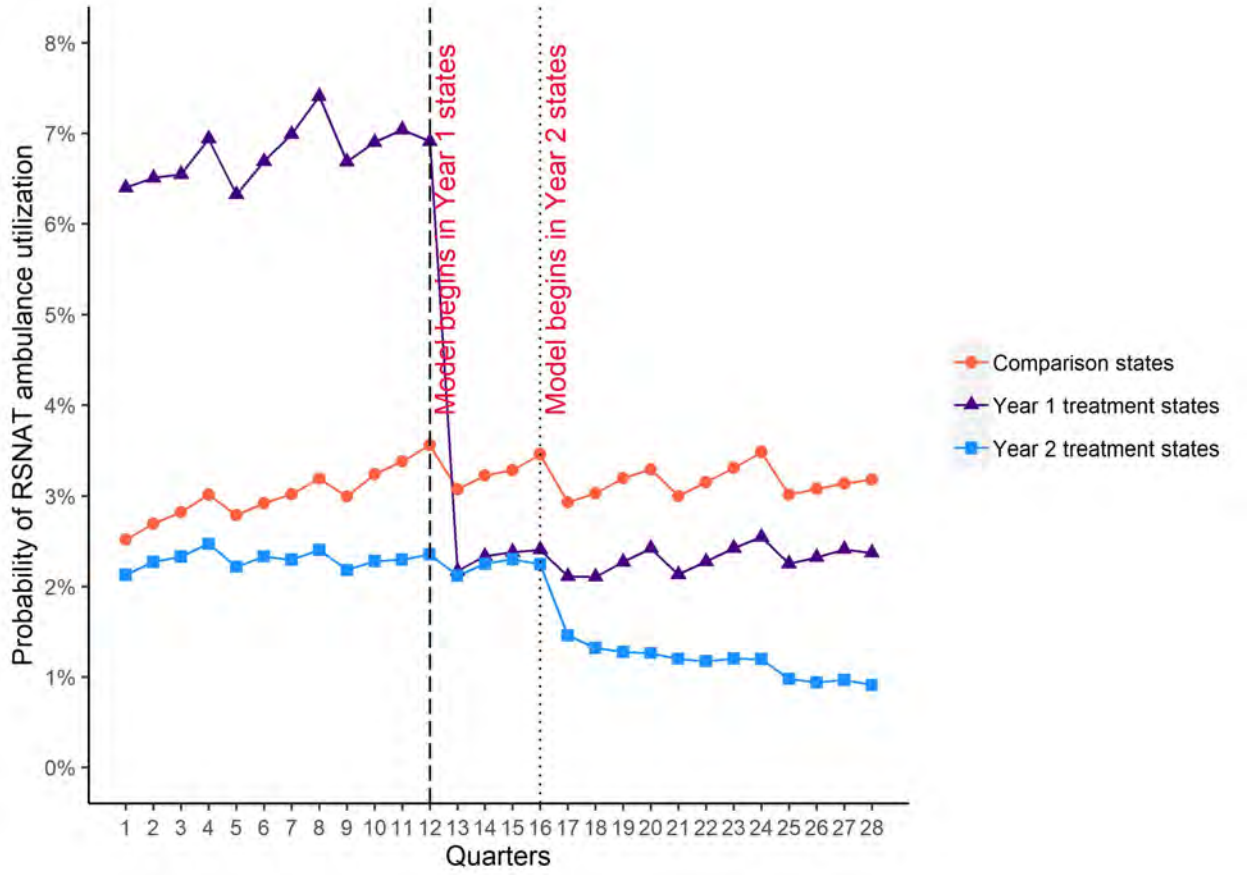
Aggregate utilization and expenditures

We plotted weighted, unadjusted RSNAT utilization and expenditures over the study period. This enabled us to assess aggregate changes following model implementation. Our analysis shows about a 70 percent decrease between baseline and follow-up for both measures among beneficiaries with ESRD and/or pressure ulcers, but no discernible trend in comparison states (Figures III.2 and III.3).[20] We observed a drop of around 70 percent in both RSNAT utilization

[20] The figures showing unadjusted utilization and expenditures also show a seasonal pattern that arises from our strategy of including beneficiaries annually by HCC score. The study population in early quarters of the year includes beneficiaries who will eventually be diagnosed with qualifying conditions, but whose disease state is not

and expenditures for Year 1 model states immediately following implementation at the end of 2014. We saw a smaller (but similar in percentage terms) decrease immediately following implementation in the Year 2 model states (which had started from a much lower utilization level) at the start of 2016. We saw no deviation from the baseline trend in the comparison states at the implementation date for either Year 1 or Year 2 states.

Figure III.2. Probability of RSNAT utilization among beneficiaries with ESRD and/or pressure ulcers, by quarter



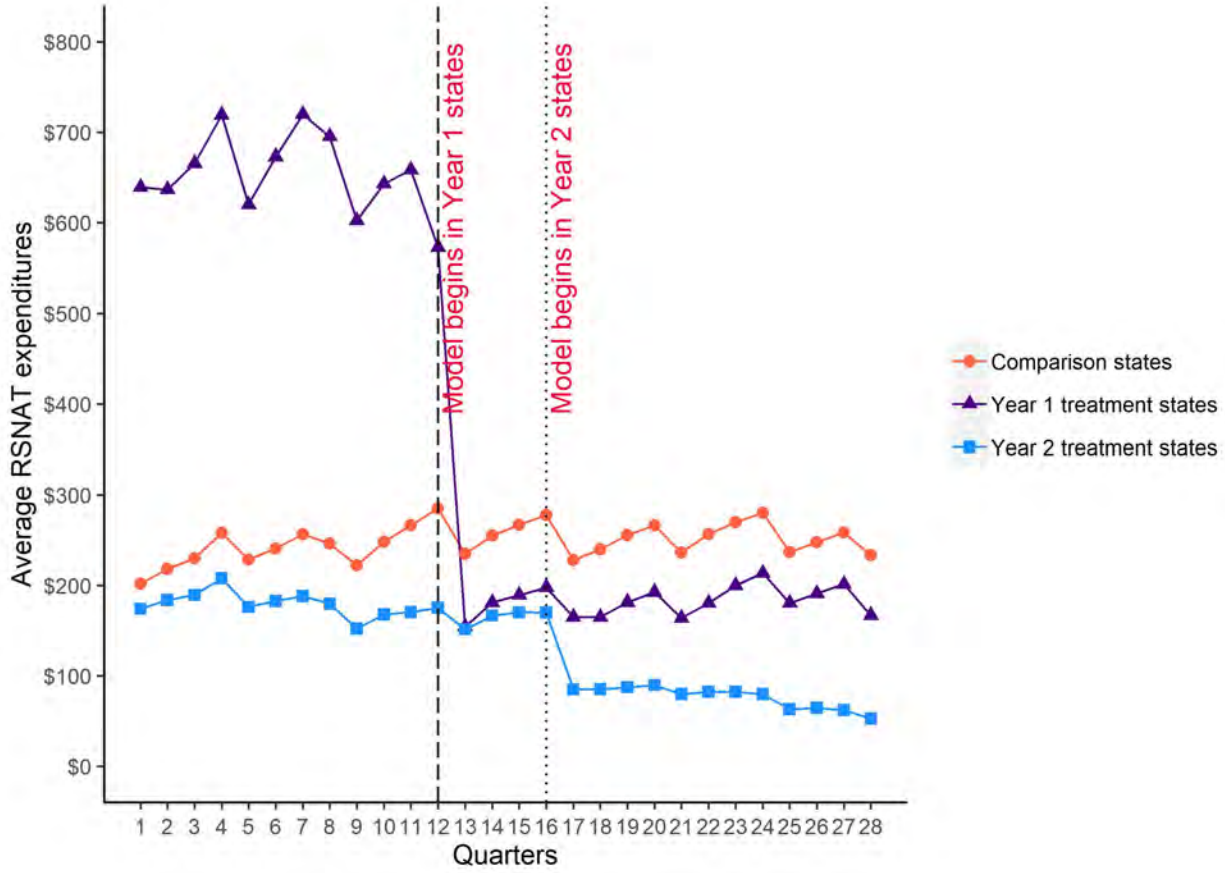
Source: Medicare FFS claims January–March 2012 (Q1) through October–December 2018 (Q28).

Note: Year 1 model states were New Jersey, Pennsylvania, and South Carolina. Year 2 model states were Delaware, Maryland, North Carolina, Virginia, West Virginia, and the District of Columbia.

ESRD = end-stage renal disease; RSNAT = repetitive scheduled non-emergent ambulance transport.

yet advanced enough to require RSNAT. As a result, utilization rates are lower earlier in the year than later, when all included beneficiaries have received their diagnoses. This seasonal pattern is identical for model and comparison groups and does not pose a problem for our difference-in-differences design, which includes quarter fixed effects.

Figure III.3. Average RSNAT expenditures among beneficiaries with ESRD and/or pressure ulcers, by quarter



Source: Medicare FFS claims January–March 2012 (Q1) through October–December 2018 (Q28).

Note: Year 1 model states were New Jersey, Pennsylvania, and South Carolina. Year 2 model states were Delaware, Maryland, North Carolina, Virginia, West Virginia, and the District of Columbia.

ESRD = end-stage renal disease; RSNAT = repetitive scheduled non-emergent ambulance transport.

In the next subsection, we use multivariate analysis to build on these aggregate descriptive analyses. These analyses enable us to more completely assess the impacts of prior authorization on RSNAT utilization and expenditures. Appendices F and G describe the precision of the analysis.

Multivariate analysis

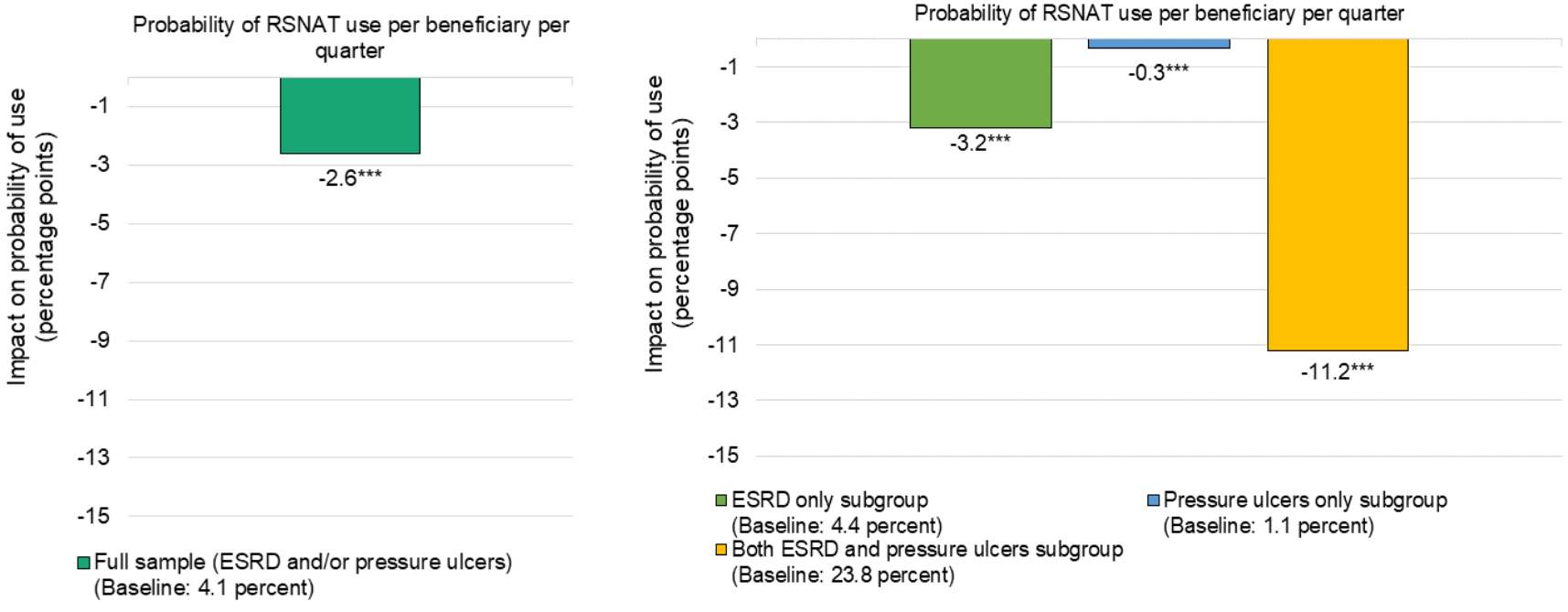
We performed multivariate, difference-in-differences analyses to gauge the impact of RSNAT-PA. We performed these analyses on the full study population (beneficiaries with ESRD and/or pressure ulcers), as well as separately on the ESRD and pressure ulcer subgroups and in Year 1 versus Year 2 states. Each analysis provides important insights into the impact of the model and the possible explanations for the effects we observed.

RSNAT utilization

Controlling for beneficiaries' demographic and health characteristics, we found that RSNAT utilization decreased as a result of RSNAT-PA. In the full sample of beneficiaries with ESRD and/or pressure ulcers, the probability of RSNAT ambulance service decreased by almost 3 percentage points relative to the comparison group. This represents a decrease of about 63 percent of their baseline utilization rate. The left panel of Figure III.4 illustrates this finding. We also found a decrease of a similar magnitude in any Medicare ambulance use, suggesting that nearly all of the reduction in Medicare ambulance use can be attributed to the reduction in RSNAT use (Appendix Table E.5). It also suggests that other types of ambulance trips (such as emergency ambulance trips) did not substitute for RSNAT trips during the period when RSNAT trips declined.

We also examined the impacts on utilization in the subgroups of beneficiaries who had both ESRD and pressure ulcers, pressure ulcers only, and ESRD only. The right panel in Figure III.4 shows that the effects of the model were largest for beneficiaries with both ESRD and pressure ulcers. Beneficiaries who had both conditions had the highest use of RSNAT services in the baseline period; the quarterly probability that they would use RSNAT was 24 percent. During RSNAT-PA, utilization decreased 11 percentage points for this subgroup, relative to beneficiaries in the comparison states. This change represents a decrease of almost one-half of their baseline utilization rate. In comparison, beneficiaries with pressure ulcers only had the lowest use of RSNAT services in the baseline period, at 1 percent. These beneficiaries experienced a decrease of 0.3 percentage points, a change which still amounted to nearly one-third of the baseline rate. Beneficiaries with ESRD only had an intermediate baseline use rate of 4 percent. They experienced a 3.2 percentage point decrease in the probability of RSNAT use, relative to the comparison group. This change represents a decrease of almost three-quarters of their baseline utilization rate.

Figure III.4. Impact of RSNAT-PA on RSNAT use per beneficiary per quarter, full sample and by chronic condition



*** p < 0.001.

Note: Figure presents results from logistic regression analysis of claims between 2012 and 2018 for beneficiaries with ESRD and/or pressure ulcers (11,566,321 beneficiary-quarters), ESRD only (8,109,475 beneficiary-quarters), pressure ulcers only (3,118,359 beneficiary quarters), and both ESRD and pressure ulcers (338,487 beneficiary quarters).
ESRD = end-stage renal disease; RSNAT-PA = Prior Authorization Model for Repetitive, Scheduled, Non-Emergent Ambulance Transport.

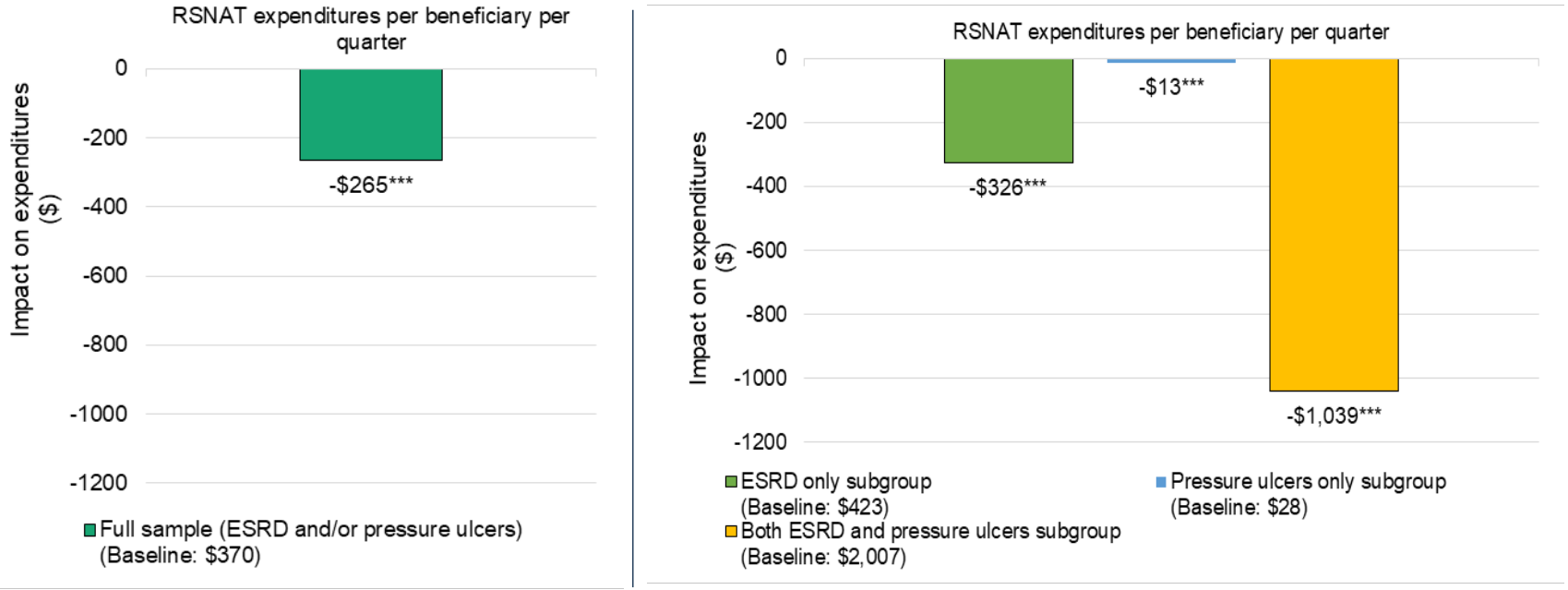
RSNAT expenditures

We also found that RSNAT expenditures declined as a result of the model. RSNAT expenditures decreased by an average of $265 per beneficiary per quarter (left panel of Figure III.5). The estimated decrease represents almost three-quarters of their baseline expenditures. This translates into an estimated cumulative savings to Medicare of about $550 million for RSNAT services for beneficiaries with ESRD and/or pressure ulcers over the post-implementation study period (16 quarters for Year 1 states, 12 quarters for Year 2 states), or an average of $138 million per year since the model start. In addition, average quarterly expenditures on all Medicare ambulance services per beneficiary declined by $333 (Appendix Table E.5). Beneficiaries with ESRD (with or without pressure ulcers) accounted for most of the decrease in RSNAT expenditures (right panel of Figure III.5). Beneficiaries with pressure ulcers only saw only a very small decrease ($13 per beneficiary per quarter).

Total Medicare expenditures

For the full sample (beneficiaries with ESRD and/or pressure ulcers), total Medicare health care expenditures decreased by $316 per beneficiary per quarter, a decrease that amounts to 2 percent of baseline expenditures (left panel of Figure III.6). This decrease translates to cumulative savings to Medicare of about $650 million for beneficiaries with ESRD and/or pressure ulcers over the post-implementation study period. The total expenditure results differed between the three chronic condition subgroups (right panel of Figure III.6). Total Medicare expenditures fell by $443 per beneficiary per quarter (about 3 percent of baseline expenditures) for beneficiaries with ESRD only, and by $1,060 per beneficiary per quarter (about 2 percent of baseline expenditures) for beneficiaries with both ESRD and pressure ulcers. However, total Medicare expenditures increased by $245 per beneficiary per quarter (about 1 percent of baseline expenditures) for beneficiaries with pressure ulcers only. We found that, although expenditures for professional services (which include RSNAT) decreased for beneficiaries with pressure ulcers, expenditures in all other categories increased by similar or larger amounts (Figure III.7). Given that this group saw only a small decrease in RSNAT use and expenditures, it is likely these changes in other expenditure categories arise from other changes in policy that affect beneficiaries with pressure ulcers, or from differences in the model and comparison states, rather than as an impact of RSNAT-PA.

Figure III.5. Impact of RSNAT-PA on RSNAT expenditures per beneficiary per quarter, full sample and by chronic condition

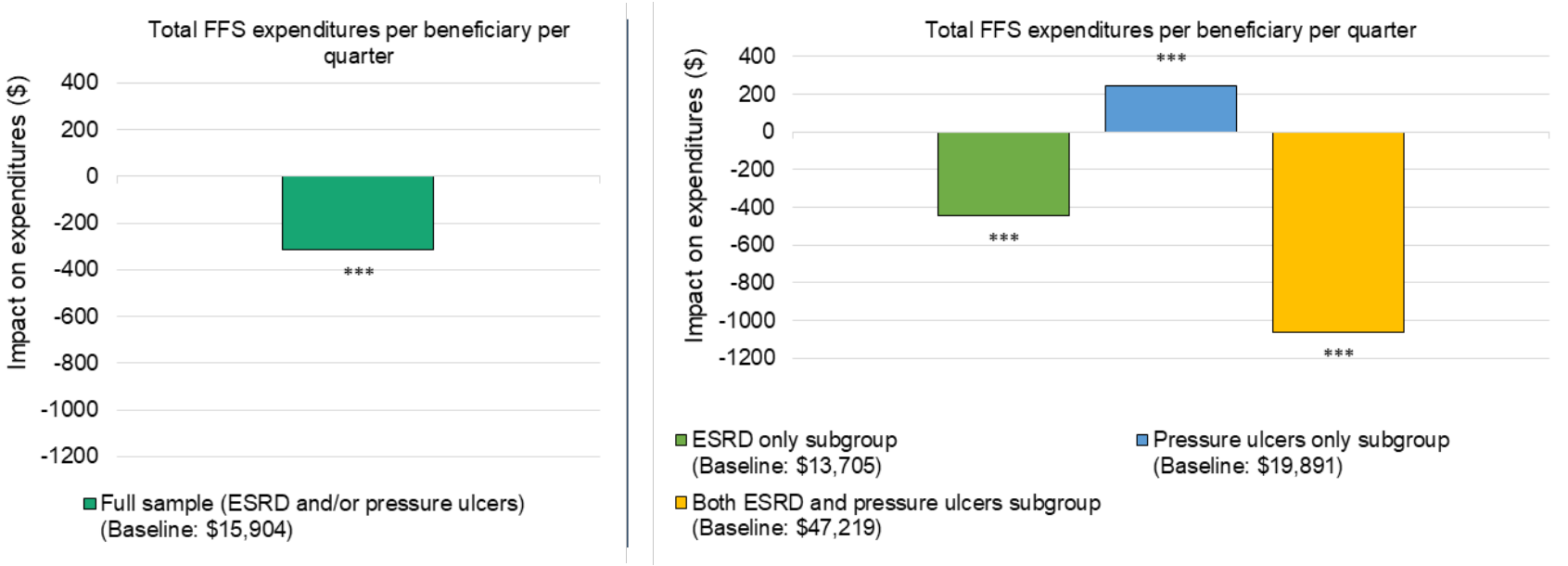


*** p < 0.001.

Note: Figure presents results from OLS regression analysis of claims between 2012 and 2018 for beneficiaries with ESRD and/or pressure ulcers (11,566,321 beneficiary-quarters), ESRD only (8,109,475 beneficiary-quarters), pressure ulcers only (3,118,359 beneficiary quarters), and both ESRD and pressure ulcers (338,487 beneficiary quarters).

ESRD = end-stage renal disease; RSNAT-PA = Prior Authorization Model for Repetitive, Scheduled, Non-Emergent Ambulance Transport.

Figure III.6. Impact of RSNAT-PA on total Medicare FFS expenditures per beneficiary per quarter, full sample and by chronic condition

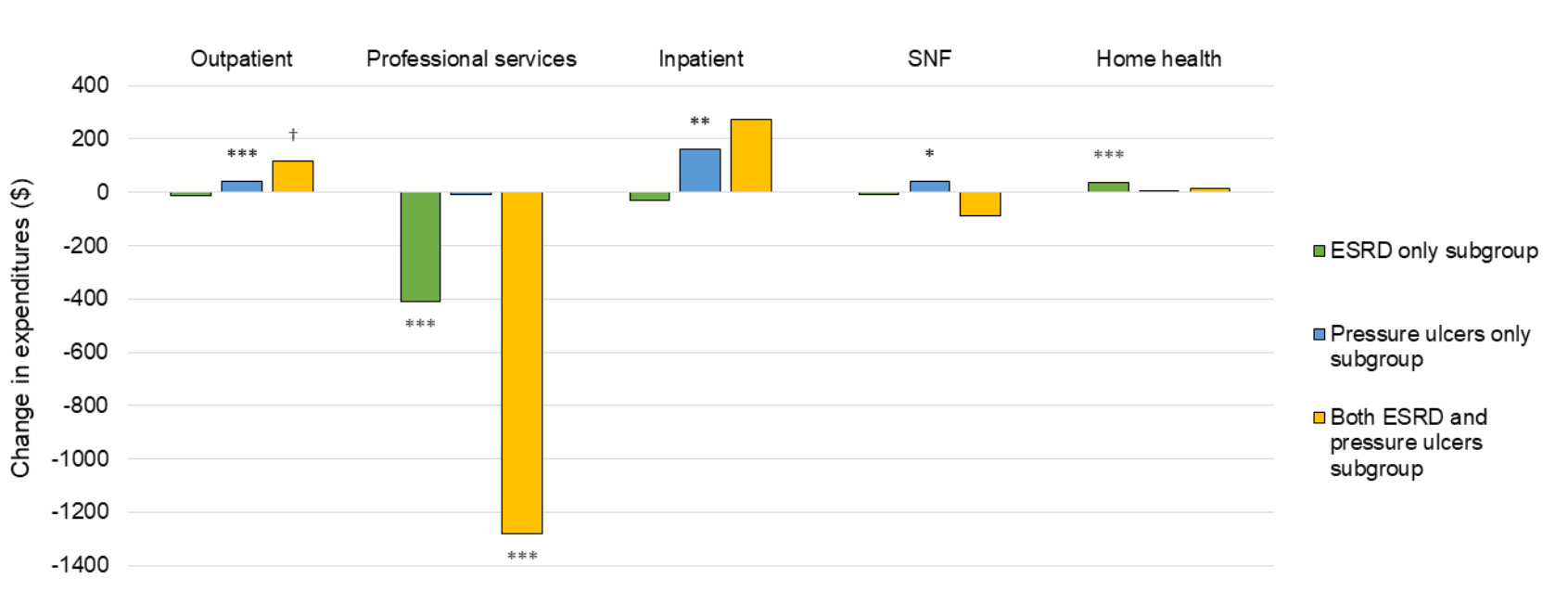


*** p < 0.001.

Note: Figure presents results from OLS regression analysis of claims between 2012 and 2018 for beneficiaries with ESRD and/or pressure ulcers (11,566,321 beneficiary-quarters), ESRD only (8,109,475 beneficiary-quarters), pressure ulcers only (3,118,359 beneficiary quarters), and both ESRD and pressure ulcers (338,487 beneficiary quarters).|

ESRD = end-stage renal disease; FFS = fee-for-service; RSNAT-PA = Prior Authorization Model for Repetitive, Scheduled, Non-Emergent Ambulance Transport.

Figure III.7. Impact of RSNAT-PA on expenditures per beneficiary per quarter, by chronic condition



† p < 0.10, * p < 0.05, ** p < 0.01, *** p < 0.001.

Note: RSNAT falls under professional services.

Note: Figure presents results from OLS regression analysis of claims between 2012 and 2018 for beneficiaries with ESRD and/or pressure ulcers (11,566,321 beneficiary-quarters), ESRD only (8,109,475 beneficiary-quarters), pressure ulcers only (3,118,359 beneficiary quarters), and both ESRD and pressure ulcers (338,487 beneficiary quarters).

ESRD = end-stage renal disease; RSNAT-PA = Prior Authorization Model for Repetitive, Scheduled, Non-Emergent Ambulance Transport; SNF = skilled nursing facility.

Results by model cohort

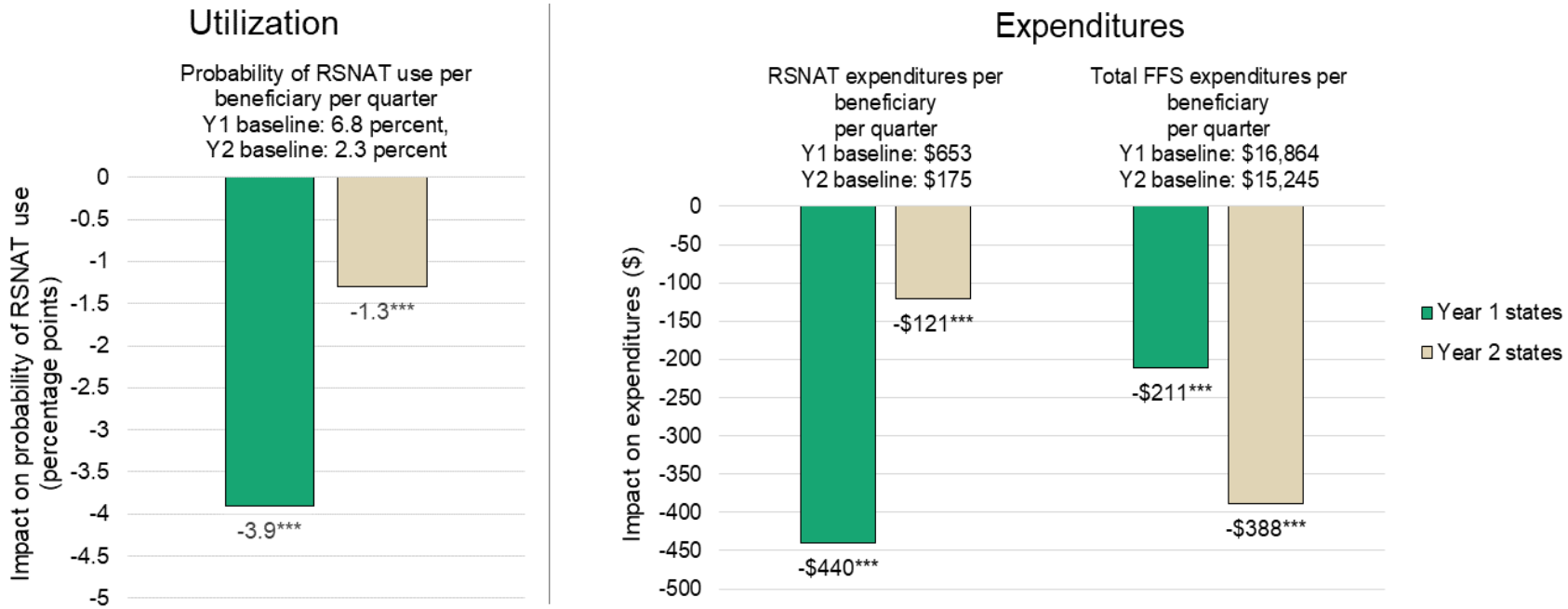
We ran separate analyses for the Year 1 and Year 2 states. We did so because CMS included them in the model for different reasons, and therefore the conclusions we can draw from the findings for each group may differ.[21] Both cohorts had statistically significant decreases in utilization, but the magnitudes were much larger for Year 1 model states. This result is not surprising, given that Year 1 states had substantially higher baseline utilization rates. The percentage declines relative to baseline were similar for the two groups of states. For example, the decrease in RSNAT use amounted to 57 percent of the baseline rate in both the Year 1 and Year 2 states. The left panel of Figure III.8 presents the utilization and expenditure results by model cohort.[22]

As with RSNAT utilization, RSNAT expenditures declined more in Year 1 states than Year 2 states. However, we found the opposite pattern for total Medicare expenditures (right panel of Figure III.8). Total Medicare expenditures decreased in both groups, but the magnitude of the decrease was greater in Year 2 states ($388, or 3 percent of baseline expenditures) than in Year 1 states ($211, or 1 percent of baseline expenditures), relative to the comparison group. In fact, total Medicare expenditures decreased by a smaller amount than RSNAT expenditures in the Year 1 states, and a larger amount in Year 2 states. This suggests that, in response to the model, non-RSNAT expenditures tended to rise somewhat in the Year 1 states and to fall more substantially in the Year 2 states. When we examined expenditures by category, we found important differences between the cohorts (Figure III.9). Specifically, we found that expenditures for inpatient, outpatient, and SNF services increased among the Year 1 states while these expenditures decreased for the Year 2 states. All differences between the cohorts were statistically significant at the 1 percent level.

[21] Year 1 states were selected for high RSNAT utilization; Year 2 states were included as required by MACRA.

[22] Our comparison group strategy optimized for balance between the full model and comparison groups. Our balance was therefore slightly worse when we removed one of the cohorts to run these separate Year 1 and Year 2 analyses. However, for both groups, the balance was still very good, and well within bounds generally considered suitable for this type of analysis (less than 0.05 standard deviations).

Figure III.8. Impacts of RSNAT-PA on utilization and expenditures per beneficiary per quarter, by cohort

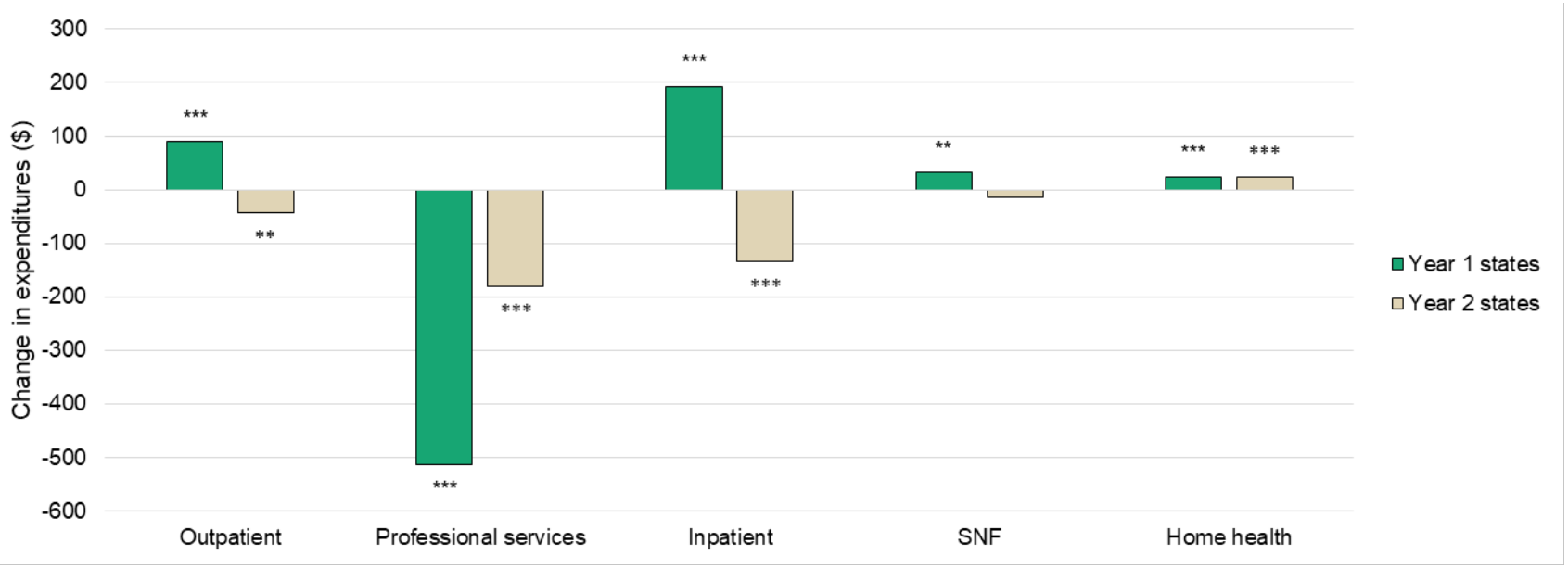


*** p < 0.001.

Note: Figure presents results from logistic regression analysis of claims between 2012 and 2018 for beneficiaries with ESRD and/or pressure ulcers (11,566,321 beneficiary-quarters), ESRD only (8,109,475 beneficiary-quarters), pressure ulcers only (3,118,359 beneficiary quarters), and both ESRD and pressure ulcers (338,487 beneficiary quarters).

FFS = fee-for-service; RSNAT-PA = Prior Authorization Model for Repetitive, Scheduled, Non-Emergent Ambulance Transport.

Figure III.9. Impact of RSNAT-PA on expenditures per beneficiary per quarter, by expenditure category and cohort



** p < 0.01, *** p < 0.001.

Note: Figure presents results from OLS regression analysis of claims between 2012 and 2018 for beneficiaries with ESRD and/or pressure ulcers (11,566,321 beneficiary-quarters), ESRD only (8,109,475 beneficiary-quarters), pressure ulcers only (3,118,359 beneficiary quarters), and both ESRD and pressure ulcers (338,487 beneficiary quarters).

RSNAT-PA = Prior Authorization Model for Repetitive, Scheduled, Non-Emergent Ambulance Transport; SNF = skilled nursing facility.

We conducted additional analyses to better understand why the impacts on total expenditures were different between Year 1 and Year 2 states. We examined the change in expenditures for all major categories of service by both cohort and study population subgroup (Table III.1). We found that the Year 1 versus Year 2 differences are driven largely by beneficiaries with ESRD. Beneficiaries with ESRD in the Year 1 and Year 2 cohorts experienced impacts in opposite directions for a number of categories. Given the large size of the ESRD subgroup, it is not surprising that impacts within this group strongly influenced the estimates for the full study population. By contrast, impacts for the pressure ulcer only group generally appear to be consistent across the cohorts. We discuss potential reasons for the divergent findings after we present the results for Objective 2.

Subgroup analyses

We repeated the analyses, dividing by rural residence and dual eligibility for Medicare and Medicaid. The results were consistent across all subgroups, but the sizes of the changes we observed and percentage changes from baseline were, in general, much larger for non-rural than for rural residents. Estimated impacts for dually eligible beneficiaries were similar to those observed for non-dually eligible beneficiaries in percentage terms but the dollar amounts were larger. We present the divided results in Appendix E.

We also conducted this same set of analyses on the subgroup of beneficiaries who had a claim for a home hospital bed.[23] We hypothesized that beneficiaries who have a hospital bed at home likely have mobility limitations. Thus, we hoped to use home hospital bed claims to identify a subgroup of beneficiaries who were more likely to meet the coverage criterion of being bed bound. The results for this subgroup were similar but larger in magnitude than those for the full set of beneficiaries, indicating that beneficiaries with claims for home hospital beds were indeed affected more by the prior authorization model. These findings suggest that having a home hospital bed may be a poor proxy for meeting the RSNAT coverage criterion of being bed bound. See Appendix E for the home hospital bed subgroup results.

Objective 1 summary

RSNAT-PA reduced RSNAT use and expenditures by over 60 percent. Reductions were larger for Year 1 states, which had much higher baseline utilization and expenditures. Total Medicare FFS expenditures declined for beneficiaries with ESRD (with or without pressure ulcers), but they increased for beneficiaries with pressure ulcers only. Beneficiaries in Year 1 states experienced decreased total expenditures, but their expenditures in non-RSNAT services rose, partially countering the effects of the model.

[23] We examined 928,464 beneficiary-quarters.

Table III.1. Impact of RSNAT-PA on expenditures per beneficiary per quarter (direction of finding, magnitude, and statistical significance)

	Any condition		ESRD only		Pressure ulcers only		Multiple conditions	
	Year 1 cohort	Year 2 cohort	Year 1 cohort	Year 2 cohort	Year 1 cohort	Year 2 cohort	Year 1 cohort	Year 2 cohort
Total Medicare expenditures ($)	-211***b	-388***b	-301***b	-527***a	290**f	249**f	-1,264*a	-954*a
Outpatient expenditures	90***f	-55***b	110***f	-93***b	58***f	32*e	214*f	101d
Professional services expenditures	-530***a	-191***b	-636***a	-238***b	-71***b	52***f	-2,128***a	-644***a
Inpatient expenditures	194***f	-143***b	190***f	-208***b	230**f	93d	681d	-299d
Skilled nursing facility expenditures	32**e	-14d	7d	-20**c	36d	28d	-29d	-162*b
Home health expenditures	24***e	23***e	43***e	35***e	14d	3d	-16d	34d
Durable medical equipment expenditures	-14***c	-11***c	-7d	-6d	-20**c	-29***c	-43d	-10d
Hospice expenditures	-8d	4d	-8*c	3d	42**e	70***f	57*f	26d

Note: Table shows the change in expenditures ($) per beneficiary per quarter, by expenditure category, attributable to RSNAT-PA. Cells denoted with footnotes a/b/c (also shaded in Green) indicate a reduction in expenditures, cells denoted with footnotes d/e (also shaded in red) indicate an increase, with higher color saturation indicating larger changes. Only findings that are statistically significant at the 5 percent level or lower are shaded. Figure presents results from logistic regression analysis of claims between 2012 and 2018 for beneficiaries with ESRD and/or pressure ulcers (11,566,321 beneficiary-quarters), ESRD only (8,109,475 beneficiary-quarters), pressure ulcers only (3,118,359 beneficiary quarters), and both ESRD and pressure ulcers (338,487 beneficiary quarters).

†p < 0.10, *p < 0.05, **p < 0.01, ***p < 0.001.

[a]Dark Green cells: Prior authorization resulted in a statistically significant decrease in expenditures of $500 or more per beneficiary quarter

[b]Medium Green cells: Prior authorization resulted in a statistically significant decrease in expenditures of between $500 and $50 per beneficiary quarter

[c]Light Green cells: Prior authorization resulted in a statistically significant decrease in expenditures of less than $50 per beneficiary quarter

[d]Unshaded cells: Prior authorization did not result in a statistically significant change in expenditures per beneficiary quarter

[e]Light Red cells: Prior authorization resulted in a statistically significant increase in expenditures of less than $50 per beneficiary quarter

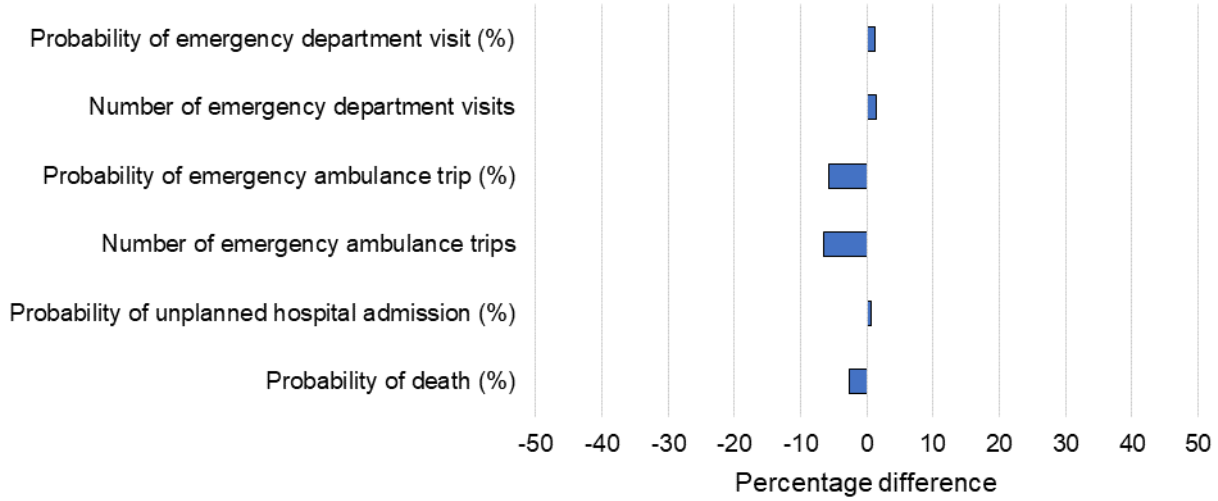
[f]Dark Red cells: Prior authorization resulted in a statistically significant increase in expenditures of $50 or more per beneficiary quarter

ESRD = end-stage renal disease; RSNAT-PA = Prior Authorization Model for Repetitive, Scheduled, Non-Emergent Ambulance Transport.

Objective 2: Quality of care and access to care

We next explored the extent to which RSNAT-PA may have had unintended adverse effects on quality of and access to care. We first examined emergency department use, emergency ambulance use, hospital admissions, and death. These outcomes pertained to the full study population of beneficiaries with ESRD and/or pressure ulcers. Baseline rates of these adverse events were similar for model and comparison states (Figure III.10).

Figure III.10. Percentage differences in baseline quality of care between model and comparison states



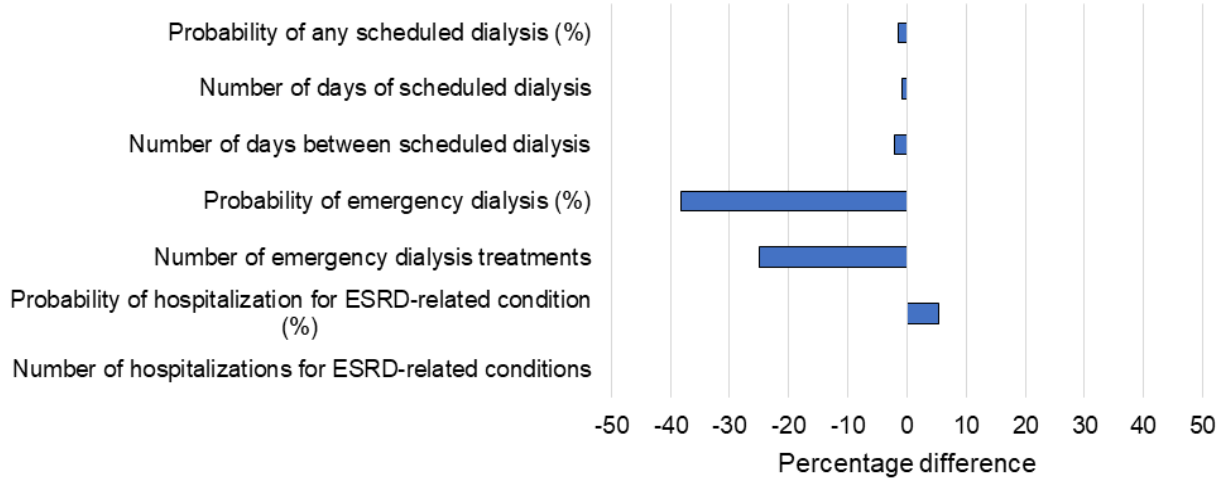
Note: Figure shows percentage difference in baseline utilization between model and comparison states. The baseline period is 2012–2014 for Year 1 states and 2012–2015 for Year 2 states. Bars to the right of the 0-axis represent greater utilization in the model states; bars to the left of the 0-axis represent lower utilization in the model states. Utilization is measured per beneficiary per quarter. Comparison group individuals are weighted to resemble model state individuals on baseline demographic and health characteristics. The model states were Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, South Carolina, Virginia, West Virginia, and the District of Columbia. The comparison states were Alabama, Florida, Georgia, Indiana, Kentucky, Louisiana, Massachusetts, Montana, Nebraska, Ohio, Tennessee, Texas, and Washington.

We also studied access to care for beneficiaries with ESRD (including beneficiaries with ESRD only and beneficiaries with both ESRD and pressure ulcers). For this subgroup, we estimated the probability of receiving scheduled dialysis treatment, the number of days on which scheduled dialysis was performed, and the average number of days between scheduled treatments.[24] We included additional adverse outcomes for untreated ESRD. In particular, we studied emergency dialysis administered in a hospital outpatient department and hospitalization for conditions related to inadequate ESRD management. Figure III.11 presents the baseline differences between

[24] Several dialysis services can be delivered on a single day, but dialysis services must be delivered regularly. We therefore used the number of days of dialysis service and the number of days between treatments, rather than the total volume of dialysis services provided, to measure access to care. Because the recommended delivery schedule for dialysis typically does not vary for a given patient, an increase in the number of days between treatments could indicate a delay in receiving needed care.

model and comparison states on these ESRD-specific outcome measures. Emergency dialysis treatments were somewhat rarer among model than comparison group beneficiaries. The percentage differences are large because baseline utilization was low for both groups (less than 4 percent). Small differences in low utilization rates correspond to large percentage differences. On other measures, the two groups were similar.

Figure III.11. Percentage differences in baseline access to care among beneficiaries with ESRD between model and comparison states



Note: Figure shows percentage difference in baseline utilization between model and comparison states, for beneficiaries with ESRD. The baseline period is 2012–2014 for Year 1 states and 2012–2015 for Year 2 states. Bars to the right of the 0-axis represent greater utilization in the model states; bars to the left of the 0-axis represent lower utilization in the model states. Utilization is measured per beneficiary per quarter. Comparison group individuals are weighted to resemble model state individuals on baseline demographic and health characteristics. The model states were Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, South Carolina, Virginia, West Virginia, and the District of Columbia. The comparison states were Alabama, Florida, Georgia, Indiana, Kentucky, Louisiana, Massachusetts, Montana, Nebraska, Ohio, Tennessee, Texas, and Washington.

ESRD = end-stage renal disease.

Multivariate analysis: quality of care

As we did in the utilization and expenditures subsection, we examined impacts for the full sample, the study's three chronic condition subgroups, and the model's two cohorts.

Results for the full sample and by chronic condition

In the full sample and in all three condition subgroups, we found no evidence that RSNAT-PA had adverse impacts on beneficiaries. In fact, we found reductions in emergency department use and unplanned hospitalizations, [25] although the effects were very small and likely due to chance or to underlying differences between model and comparison groups rather than to the model itself (Table III.2).[26]

[25] We also studied all hospital admissions (planned and unplanned together) and results were similar.

[26] Such small impact estimates could also result from policy changes that differentially affected the model and comparison groups. A change in reimbursement policy for long-term care hospitals (LTCHs) occurred during the study period, which significantly affected some of the comparison states. Our finding on hospitalization may therefore reflect the influence of the LTCH policy on the comparison group rather than an impact of the model. Although the LTCH reimbursement change would not be expected to directly influence emergency department utilization, there could be indirect effects through changes in other patterns of care use.

Table III.2. Impact of RSNAT-PA on quality of care per beneficiary per quarter, by chronic condition

	Probability of emergency department visit (percentage points) (I)	Number of emergency department visits per 1,000 beneficiaries (II)	Probability of emergency ambulance trip (percentage points) (III)	Number of emergency ambulance trips per 1,000 beneficiaries (IV)	Probability of unplanned hospital admission (percentage points) (V)	Probability of death (percentage points) (VI)
Full sample: ESRD and/or pressure ulcers (11,566,321 beneficiary-quarters)						
Baseline mean	36	650	19	305	27	5
Impact on outcome	**-1*** **	**-20*** **	**0**	**-4***	**-1*** **	**0**
Impact as percentage of baseline mean	-2	-4	0	-1	-3	-1
ESRD only subgroup (8,109,475 beneficiary-quarters)						
Baseline mean	32	580	14	225	22	3
Impact on outcome	**-1*** **	**-20*** **	**0**	**-3**	**-1*** **	**0**
Impact as percentage of baseline mean	-2	-4	0	-1	-3	-1
Pressure ulcers only subgroup (3,118,359 beneficiary-quarters)						
Baseline mean	46	800	31	510	38	11
Impact on outcome	**-1*** **	**-30*** **	**0**	**-2**	**-1*** **	**0**
Impact as percentage of baseline mean	-2	-4	1	0	-3	0
ESRD and pressure ulcers subgroup (338,487 beneficiary-quarters)						
Baseline mean	65	1,410	45	859	59	14
Impact on outcome	**-2*** **	**-70*** **	**0**	**-15**	**-2*** **	**-1***
Impact as percentage of baseline mean	-2	-5	-1	-2	-3	-4

Note: The table presents estimated impacts on outcomes attributable to RSNAT-PA from weighted logistic (columns I, III, V, VI) and ordinary least squares (columns II, IV) regression analyses of claims between 2012 and 2018 for beneficiaries with ESRD and/or pressure ulcers. Control variables include age, age squared, sex, race, rural residence, dual eligibility for Medicare and Medicaid, hospital bed claim, an indicator for residing in a county with a moratorium on new Medicare suppliers, Hierarchical Condition Category (HCC) score, and length of time since the county moratorium took effect. Standard errors were adjusted to account for correlation between observations on the same individual. The model states were Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, South Carolina, Virginia, West Virginia, and the District of Columbia. The comparison states were Alabama, Florida, Georgia, Indiana, Kentucky, Louisiana, Massachusetts, Montana, Nebraska, Ohio, Tennessee, Texas, and Washington.

"Baseline mean" is the unadjusted baseline mean of the outcome among model state beneficiaries. "Impact on outcome" is the impact of RSNAT-PA on the outcome in the units of the outcome measure (percentage points or counts) and is the regression-adjusted average marginal effect. "Impact as a

percentage of baseline mean" gives the impact on outcome as a percentage of the baseline mean, to contextualize the magnitude of the impact. The impact on outcome cannot be added or subtracted from the baseline mean to obtain the final level of the outcome measure post-model implementation, as they arise from two separate analytic methods.

*p < 0.05, ***p < 0.001.

ESRD = end-stage renal disease; RSNAT-PA = Prior Authorization Model for Repetitive, Scheduled, Non-Emergent Ambulance Transport.

Results by model cohort

We also ran separate models for the Year 1 and Year 2 states. Neither set of states experienced adverse impacts attributable to the model. While several impact estimates were statistically significant, all were small. Table III.3 presents the results by cohort. Differences between the cohorts were statistically significant at the 1 percent level, except for probability of death, where the difference was not statistically significant at conventional levels.

Table III.3. Impact of RSNAT-PA on quality of care per beneficiary per quarter, by cohort

	Probability of emergency department visit (percentage points) (I)	Number of emergency department visits per 1,000 beneficiaries (II)	Probability of emergency ambulance trip (percentage points) (III)	Number of emergency ambulance trips per 1,000 beneficiaries (IV)	Probability of hospital admission (percentage points) (V)	Probability of death (percentage points) (VI)
Year 1 cohort (9,480,975 beneficiary-quarters)						
Baseline mean	35	610	19	312	27	6
Impact on outcome	**-0.3*** **	**-20*** **	**-0.4*** **	**-14*** **	**-0.3*** **	**0**
Impact as percentage of baseline mean	-1	-3	-2	-4	-1	-1
Year 2 cohort (9,628,136 beneficiary-quarters)						
Baseline mean	36	670	18	301	26	5
Impact on outcome	**-1*** **	**-30*** **	**0.5*** **	**4***	**-1*** **	**0**
Impact as percentage of baseline mean	-3	-5	3	1	-6	0

Note: The table presents estimated impacts on outcomes attributable to RSNAT-PA from weighted logistic (columns I, III, V, VI) and ordinary least squares (columns II, IV) regression analyses of claims between 2012 and 2018 for beneficiaries with ESRD and/or pressure ulcers . Control variables include age, age squared, sex, race, rural residence, dual eligibility for Medicare and Medicaid, hospital bed claim, an indicator for residing in a county with a moratorium on new Medicare suppliers, Hierarchical Condition Category (HCC) score, and length of time since the county moratorium took effect. Standard errors were adjusted to account for correlation between observations on the same individual. The model states were Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, South Carolina, Virginia, West Virginia, and the District of Columbia. The comparison states were Alabama, Florida, Georgia, Indiana, Kentucky, Louisiana, Massachusetts, Montana, Nebraska, Ohio, Tennessee, Texas, and Washington.

*p < 0.05, ***p < 0.001.

RSNAT-PA = Prior Authorization Model for Repetitive, Scheduled, Non-Emergent Ambulance Transport.

Subgroup analyses

In another set of analyses, we examined impacts for subgroups of beneficiaries. We present results for these subgroups in Appendix E. Results were comparable for rural and non-rural beneficiaries and for dually eligible and non-dually eligible beneficiaries. We also examined

outcomes for beneficiaries with a hospital bed claim and found that the results were similar to those for the full sample.

Multivariate analysis: access to care

Results for the full ESRD subsample and by chronic condition

We found that RSNAT-PA was associated with only small changes in use of dialysis treatment among beneficiaries with ESRD (Table III.4). We found no evidence of reduced access to care resulting in increased hospitalization for complications of ESRD. Beneficiaries with ESRD only and beneficiaries with both ESRD and pressure ulcers saw similarly small changes in outcomes.

Table III.4. Impact of RSNAT-PA on access to care per beneficiary per quarter, all ESRD beneficiaries and by chronic condition

	Probability of scheduled dialysis (percentage points) (I)	Probability of emergency dialysis (percentage points) (II)	Probability of hospitalization due to ESRD complications (percentage points) (III)	Number of hospitalizations due to ESRD complications per 1,000 beneficiaries (IV)
All ESRD beneficiaries (8,447,962 beneficiary-quarters)				
Baseline mean	54	2	2	209
Impact on outcome	**-1*** **	**0.4*** **	**-0.3*** **	**-3*** **
Impact as percentage of baseline mean	-1	19	-14	-16
ESRD only (8,109,475 beneficiary-quarters)				
Baseline mean	54	2	2	200
Impact on outcome	**-1*** **	**0.4*** **	**-0.3*** **	**-3*** **
Impact as percentage of baseline mean	-1	18	-14	-15
ESRD and pressure ulcers (338,487 beneficiary-quarters)				
Baseline mean	75	4	4	500
Impact on outcome	**0**	**1*** **	**-0.6*** **	**-10*** **
Impact as percentage of baseline mean	0	23	-13	-17

Note: The table presents estimated impacts on outcomes attributable to RSNAT-PA from weighted logistic (columns I, II, III) and ordinary least squares (column IV) regression analyses of claims between 2012 and 2018 for beneficiaries with ESRD and/or pressure ulcers. Control variables include age, age squared, sex, race, rural residence, dual eligibility for Medicare and Medicaid, hospital bed claim, an indicator for residing in a county with a moratorium on new Medicare suppliers, Hierarchical Condition Category (HCC) score, and length of time since the county moratorium took effect. Standard errors were adjusted to account for correlation between observations on the same individual. The model states were Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, South Carolina, Virginia, West Virginia, and the District of Columbia. The comparison states were Alabama, Florida, Georgia, Indiana, Kentucky, Louisiana, Massachusetts, Montana, Nebraska, Ohio, Tennessee, Texas, and Washington.

***p < 0.001.

ESRD = end-stage renal disease; RSNAT-PA = Prior Authorization Model for Repetitive, Scheduled, Non-Emergent Ambulance Transport.

Results by model cohort

We examined outcomes related to ESRD separately for the Year 1 and Year 2 cohorts of states. We found that the reduction in scheduled dialysis was concentrated among beneficiaries in the Year 2 states, but that beneficiaries in both Year 1 and Year 2 states experienced increases in emergency dialysis use (Table III.5). Both cohorts of states had decreases in admissions for ESRD-related conditions.

Table III.5. Impact of RSNAT-PA on access to care per beneficiary per quarter, all ESRD beneficiaries and by cohort

	Probability of scheduled dialysis (percentage points) (I)	Probability of emergency dialysis (percentage points) (II)	Probability of hospitalization due to ESRD complications (percentage points) (III)	Number of hospitalizations due to ESRD complications per 1,000 beneficiaries (IV)
Year 1 states (6,891,712 beneficiary-quarters)				
Baseline mean	53	2	1.8	201
Impact on outcome	**0**	**0.4*****	**-0.3*****	**-4*****
Impact as percentage of baseline mean	0	20	-17	-17
Year 2 states (7,096,367 beneficiary-quarters)				
Baseline mean	55	3	1.9	213
Impact on outcome	**-1*****	**1*****	**-0.3*****	**-4*****
Impact as percentage of baseline mean	-2	21	-16	-18

Note: The table presents estimated impacts on outcomes attributable to RSNAT-PA from weighted logistic (columns I, II, III) and ordinary least squares (column IV) regression analyses of claims between 2012 and 2018 for beneficiaries with ESRD and/or pressure ulcers. Control variables include age, age squared, sex, race, rural residence, dual eligibility for Medicare and Medicaid, hospital bed claim, an indicator for residing in a county with a moratorium on new Medicare suppliers, Hierarchical Condition Category (HCC) score, and length of time since the county moratorium took effect. Standard errors were adjusted to account for correlation between observations on the same individual. The model states were Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, South Carolina, Virginia, West Virginia, and the District of Columbia. The comparison states were Alabama, Florida, Georgia, Indiana, Kentucky, Louisiana, Massachusetts, Montana, Nebraska, Ohio, Tennessee, Texas, and Washington.

***p < 0.001.

ESRD = end-stage renal disease; RSNAT-PA = Prior Authorization Model for Repetitive, Scheduled, Non-Emergent Ambulance Transport.

Objective 2 summary

We found no evidence that RSNAT-PA had an adverse impact on quality of or access to care for beneficiaries with ESRD and/or pressure ulcers.

Objective 3: Suppliers

By reducing Medicare expenditures for RSNAT services, RSNAT-PA could cause some suppliers to exit the market. Exits are likely to be concentrated among suppliers that rely heavily on RSNAT payments. In this section, we assess whether the model was associated with suppliers exiting the Medicare program and what types of suppliers were more likely to exit. For the supplier analysis, we examined all claims billed by suppliers, not only those for services to beneficiaries with ESRD and/or pressure ulcers.

Descriptive analysis

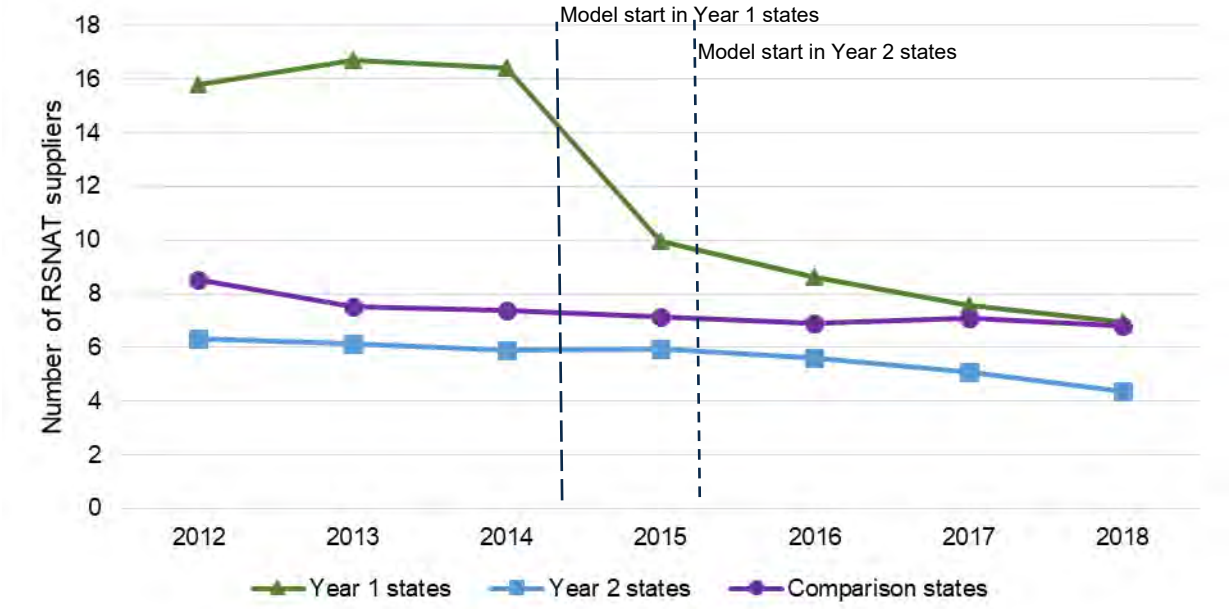
Aggregate supplier exit

Before RSNAT-PA, the Year 1 states had many more RSNAT suppliers per 100,000 FFS beneficiaries than the Year 2 and comparison states did, but the number decreased during the study period (Figure III.12). There were 16 RSNAT suppliers per 100,000 FFS beneficiaries in the Year 1 states in 2012, and only 7 by 2018, a decrease of more than half. All three Year 1 model states experienced a decrease in the number of suppliers, but the decreases were larger for Pennsylvania and New Jersey than for South Carolina. The pattern of supplier exit therefore likely reflects a combination of two important factors: (1) suppliers leaving the market in response to the model and (2) the impact of the moratorium on new suppliers in some Pennsylvania and New Jersey counties.[27]

The ratio of RSNAT suppliers to FFS beneficiaries was far lower in the Year 2 states, at about 6 per 100,000 FFS beneficiaries in 2012. It remained fairly constant until 2016, when the model went into effect in the Year 2 states and the number of RSNAT suppliers per 100,000 FFS beneficiaries began to decline to about 9 per 100,000 FFS beneficiaries. The number of comparison state suppliers per 100,000 FFS beneficiaries remained around 7 during the study period.

[27] In July 2013, CMS imposed a moratorium on new Medicare Part B ambulance suppliers in Harris County, Texas, and surrounding counties in Texas, as well as in Philadelphia, Pennsylvania, and surrounding counties (including the New Jersey counties of Burlington, Camden, and Gloucester). CMS extended the moratorium to prohibit any new non-emergency ambulance suppliers in Texas, Pennsylvania, and New Jersey from enrolling in Medicare Part B as of July 29, 2016.

Figure III.12. Number of RSNAT suppliers per 100,000 FFS beneficiaries in model and comparison states

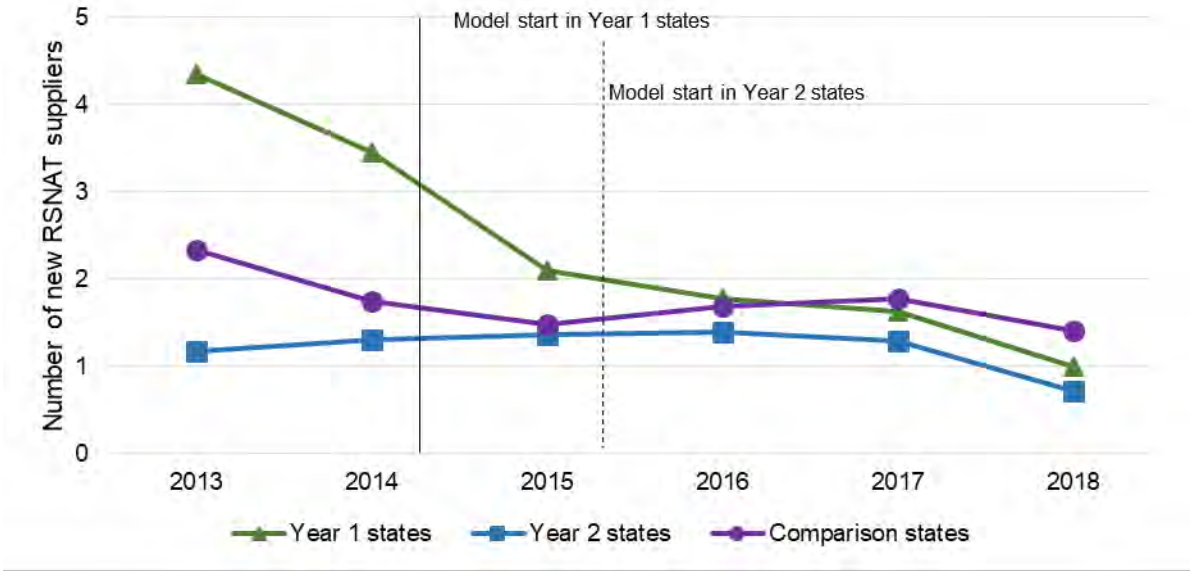


Note: Year 1 model states (start date December 2014) were New Jersey, Pennsylvania, and South Carolina. Year 2 model states (start date January 2016) were Delaware, Maryland, North Carolina, Virginia, West Virginia, and the District of Columbia. The comparison states were Alabama, Florida, Georgia, Indiana, Kentucky, Louisiana, Massachusetts, Montana, Nebraska, Ohio, Tennessee, Texas, and Washington.

FFS = fee-for-service; RSNAT = repetitive, scheduled, non-emergent ambulance transport.

The decrease in the number of RSNAT suppliers per 100,000 FFS beneficiaries came both from suppliers exiting the market and from fewer new suppliers entering. In the Year 1 states, the number of new RSNAT suppliers per 100,000 FFS beneficiaries (suppliers that had not billed previously for RSNAT) decreased from 4 in 2013 to 1 in 2018. The Year 2 states and the comparison states saw much smaller changes in the number of new entrants over the study period.

Figure III.13. New RSNAT suppliers per 100,000 FFS beneficiaries in model and comparison states



Note: New RSNAT suppliers are those that had not billed Medicare in the prior year. Because our study period begins in 2012, we cannot observe which suppliers were new in 2012.
Year 1 model states (start date December 2014) included New Jersey, Pennsylvania, and South Carolina. Year 2 model states (start date January 2016) Delaware, Maryland, North Carolina, Virginia, West Virginia, and the District of Columbia. The comparison states were Alabama, Florida, Georgia, Indiana, Kentucky, Louisiana, Massachusetts, Montana, Nebraska, Ohio, Tennessee, Texas, and Washington.

FFS = fee-for-service; RSNAT = repetitive, scheduled, non-emergent ambulance transport.

Characteristics of exiting suppliers

To assess whether certain types of suppliers of ambulance services were more likely to exit the market, we compared the pre-RSNAT-PA characteristics of suppliers that left the market to those that stayed.[28] We divided these suppliers into three types: (1) stayers, which also billed Medicare in two years after the model went into effect; (2) triers, which billed Medicare in the first year after model implementation but not after that; and (3) leavers, which did not bill Medicare at any point after the model was implemented.[29]

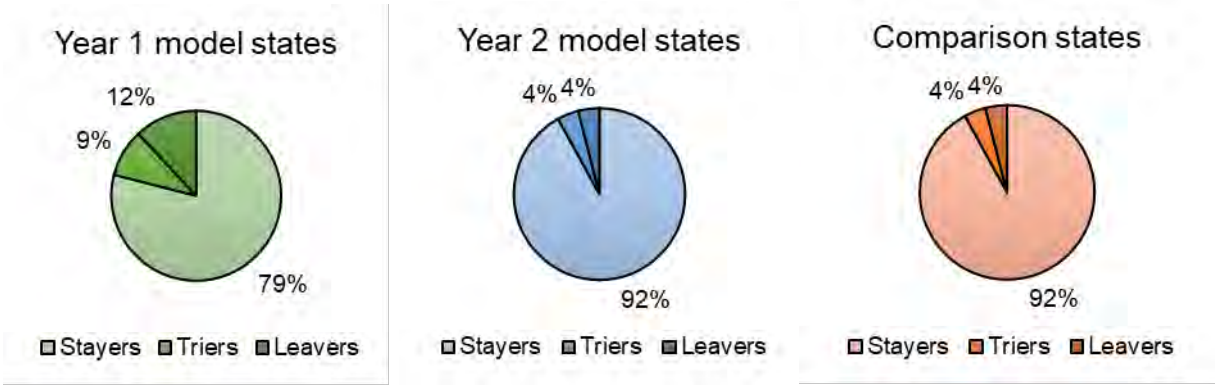
More than one-fifth of suppliers in the Year 1 model states exited the market (21 percent), and over half of those suppliers exited before the model went into effect (leavers). A much lower percentage of suppliers in the Year 2 model states and comparison states exited the market (8

[28] To assess changes among suppliers in the comparison group, we used the Year 1 start date for the states directly matched to the Year 1 model states, and the Year 2 start date for the states directly matched to the Year 2 model states. This approach enables us to separate changes in suppliers over time in the model states that are due to RSNAT-PA from changes due to other factors.

[29] A small fraction (0.5 percent) of suppliers that billed Medicare for ambulance services prior to the model start did not fit in any of these categories and were excluded from this analysis.

percent in each, with 4 percent leaving before the model start date). Figure III.14 illustrates the differences between the study groups.

Figure III.14. Percentage of suppliers that were stayers, triers, and leavers in model and comparison states



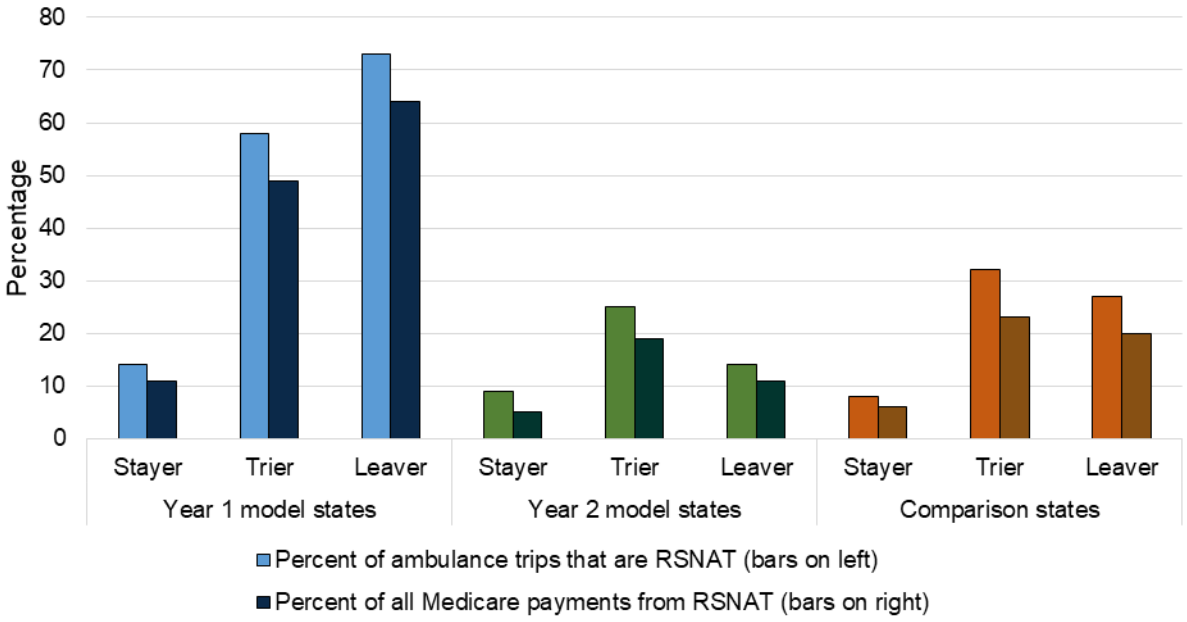
Note: Stayers, triers, and leavers are defined based on billing activity in the year before and two years after model implementation (2014-2016 in Year 1 states and 2015-2017 in Year 2 states).

Comparing the stayers, triers, and leavers revealed several differences in the model states that were not present in the comparison states. The differences—on the characteristics of their customer bases, their provision of services, and their payments received in the year before model implementation—were often especially stark for the Year 1 model states.

In Year 2 and comparison states, stayers, triers, and leavers had similar customer bases. In contrast, stayers, triers, and leavers in Year 1 model states served significantly different types of Medicare beneficiaries. Year 1 suppliers that exited the market (triers and, especially, leavers) served customer bases that were less white, less rural, sicker (higher HCC scores), and more likely to be dually eligible for Medicare and Medicaid (see Table E.9 in Appendix E).

In the Year 1 model states, triers and leavers (types that left the market) were more dependent on RSNAT services than the same types of suppliers in the Year 2 and comparison states. For example, among Year 1 triers, 58 percent of ambulance trips met the definition of RSNAT, as compared to 26 percent among Year 2 triers and 32 percent among comparison triers. Among leavers, 73 percent of ambulance trips were RSNAT trips in the Year 1 states versus 14 and 27 percent in Year 2 and comparison states. RSNAT payments were higher for all three types of suppliers in the Year 1 states than in the other state groups, and RSNAT payments comprised a larger share of Medicare payments. Almost 50 percent of Medicare payments for triers in Year 1 states were for RSNAT services, compared to around 20 percent in Year 2 and comparison states. For leavers, 64 percent of Medicare payments were for RSNAT in Year 1 states, compared to 20 percent or less in Year 2 and comparison states. Figure III.15 illustrates the differences between types of suppliers and study groups.

Figure III.15. Percentage of ambulance trips and percentage of Medicare payments for RSNAT for stayers, triers, and leavers



RSNAT = repetitive, scheduled, non-emergent ambulance transport.
Note: Stayers, triers, and leavers are defined based on billing activity in the year before and two years after model implementation (2014-2016 in Year 1 states and 2015-2017 in Year 2 states).

There were also important differences between triers and leavers, particularly in the Year 1 states. Among triers, RSNAT comprised a smaller fraction of services and payments, but on average these suppliers provided more trips and earned more from Medicare for RSNAT services than leavers (Table III.6). Thus, leavers, which chose not to operate in the market at all once RSNAT-PA was implemented, were smaller and specialized more in RSNAT. Triers were larger, on average, and perhaps expected they could survive with reduced payments under the model. Ultimately, they still depended enough on RSNAT that continuing to operate under the prior authorization model was untenable.[30]

These findings suggest that suppliers in model states did not exit the market randomly during this period. Suppliers that left the market tended to depend heavily on payments for RSNAT services. Any reductions in those payments that occurred as a result of stricter enforcement of coverage rules under RSNAT-PA might have made continuing to operate untenable and might have influenced their decision to leave the market.

[30] We conducted a placebo test using the 2012–2013 calendar year boundary to define stayers, triers, and leavers. We term this a "placebo" because no prior authorization program took effect between those years, and thus any difference between the three groups regarding RSNAT services should reflect normal churn in the market rather than an impact of the model. Between 2012 and 2013, in Year 1, Year 2, and comparison states, suppliers that were more reliant on RSNAT were more likely to leave the market. However, the rate at which RSNAT-dependent suppliers left the market in Year 1 states was half as large as it was in our main analysis, closer to the Year 2 and comparison state levels. We conclude, therefore, that RSNAT-PA influenced some suppliers to exit.

Table III.6. Quarterly services provided and payments received by stayers, triers, and leavers in the year before RSNAT-PA

	Year 1 model states			Year 2 model states			Comparison states		
	Stayers	Triers	Leavers	Stayers	Triers	Leavers	Stayers	Triers	Leavers
	Weighted mean (standard deviation)			Weighted mean (standard deviation)			Weighted mean (standard deviation)		
RSNAT services provided									
Number of beneficiaries served (RSNAT)	3	9*	7*	2	9*	4	2	6*	2†
Number of RSNAT trips	133	471*	301*,†	79	360*	146	101	268*	82†
Number of RSNAT trips per beneficiary	40	45*	39†	35	37	26	37	40	31
Percentage of ambulance trips that were RSNAT	14	58*	73*,†	9	26*	14	8	32*	27*
Payments received									
RSNAT payments ($1,000)	22	81*	52*,†	12	57*	23	16	41*	12†
Percentage of payments from RSNAT (%)	11	49*	64*,†	5	19*	11	6	23*	20*
Total Medicare FFS payments ($1,000)	97	123	78†	143	176	53*,†	117	115	47*,†

Note: The table presents weighted means and (standard deviations) of supplier characteristics from before model implementation. Stayers, triers, and leavers are defined based on billing activity in the year before and two years after model implementation (2014-2016 in Year 1 states and 2015-2017 in Year 2 states). Stayers are suppliers that were active both before and in at least two years after implementation; triers were active before and in the first year of implementation; leavers were active before, but not after, implementation. Comparison state suppliers are weighted to resemble model state suppliers in the demographic and health characteristics of their customer base. The model states were Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, South Carolina, Virginia, West Virginia, and the District of Columbia. The comparison states were Alabama, Florida, Georgia, Indiana, Kentucky, Louisiana, Massachusetts, Montana, Nebraska, Ohio, Tennessee, Texas, and Washington.

*Statistically significantly different from stayer value at 0.05 level.

† Statistically significantly different from trier value at 0.05 level.

RSNAT-PA = Prior Authorization Model for Repetitive, Scheduled, Non-Emergent Ambulance Transport.

Objective 3 summary

The number of RSNAT suppliers per 100,000 FFS beneficiaries in Year 1 states decreased by about half when RSNAT-PA went into effect. Suppliers that depended heavily on RSNAT payments were more like to leave the market. The relationship between dependence on RSNAT payments and exiting the market was much weaker in the Year 2 states and comparison states.

Objective 4: Claims denials

To determine whether RSNAT-PA affected the rate at which the Medicare program denied claims for RSNAT-related services, we examined claims for non-emergency ambulance trips, which are usually scheduled in advance rather than summoned in response to an emergency health situation. Such trips bring beneficiaries to scheduled appointments or treatments rather than to an emergency department. RSNAT-PA applies only to non-emergency ambulance trips. Claims denials for this type of trip are uncommon at the beneficiary level. Before the model took effect, the average number of non-emergency ambulance claims denied was about 7 per 100 beneficiaries per quarter (about 3.5 percent of non-emergency ambulance claims).

Multivariate analysis

Our regression model showed that claims denials increased after the model went into effect. However, this effect reduced over time—by eight quarters after implementation, the number of claims denied was not statistically significantly different from the baseline level (Figure III.16). This pattern might reflect learning on the part of ambulance suppliers about the appropriate documentation for prior authorization requests or fewer submission by non-compliant providers, who may have been more likely to exit Medicare in the model states over time. Table III.7 shows the regression results.

Figure III.16. Regression-adjusted change in number of non-emergency ambulance claims denied per 100 beneficiaries per quarter compared to baseline

Note: Figure shows regression-adjusted differences from baseline in each quarter after implementation. Q1 corresponds to Jan-Mar 2015 for Year 1 states and Jan-Mar 2016 for Year 2 states. Points with a square marker indicate the value is statistically significantly different from the baseline value at the 0.01 level.

Table III.7. Impact of prior authorization on quarterly beneficiary claims denials, by quarter after model implementation

	Number of denied non-emergency ambulance claims per 100 beneficiaries
Baseline mean	7
Q1 change from baseline	5***
Q2 change from baseline	3***
Q3 change from baseline	3***
Q4 change from baseline	3***
Q5 change from baseline	3***
Q6 change from baseline	2***
Q7 change from baseline	2***
Q8 change from baseline	1*
Q9 change from baseline	0
Q10 change from baseline	0
Q11 change from baseline	0
Q12 change from baseline	1*
Q13 change from baseline	1***

	Number of denied non-emergency ambulance claims per 100 beneficiaries
Q14 change from baseline	0
Q15 change from baseline	0
Q16 change from baseline	0

Note: The table presents estimated impacts of RSNAT-PA from weighted ordinary least squares regression analysis using claims representing dates of service from January 2012 through December 2018 for beneficiaries with ESRD and/or pressure ulcers (11,566,321 beneficiary-quarters). Control variables include age, age squared, sex, race, rural residence, dual eligibility for Medicare and Medicaid, hospital bed claim, an indicator for residing in a county with a moratorium on new Medicare suppliers, Hierarchical Condition Category score, and length of time since the county moratorium took effect. Estimated standard errors account for the fact that individuals are observed for multiple quarters in the data set. The model states were Delaware, Maryland, New Jersey, North Carolina, Pennsylvania, South Carolina, Virginia, West Virginia, and the District of Columbia. The comparison states were Alabama, Florida, Georgia, Indiana, Kentucky, Louisiana, Massachusetts, Montana, Nebraska, Ohio, Tennessee, Texas, and Washington.

*p < 0.05, ***p < 0.001.

ESRD = end-stage renal disease; RSNAT-PA = Prior Authorization Model for Repetitive, Scheduled, Non-Emergent Ambulance Transport.

Objective 4 summary

The claims denial rate rose immediately upon implementation of RSNAT-PA, but it declined back toward the baseline rate within eight quarters.

IV. CONCLUSIONS

Our analysis of the effects of RSNAT-PA suggests that the model reduced the use of RSNAT services substantially. We found no evidence that RSNAT-PA had adverse impacts on beneficiaries as measured by increased emergency service use, increased hospitalizations, or death. We further found that RSNAT-PA was associated with only small changes in use of dialysis treatment among beneficiaries with ESRD. We found no evidence of reduced access to care resulting in increased hospitalization for complications of ESRD.

Limitations. The conclusions in this report are based on analyses of claims data from Year 1 and Year 2 model states. In drawing these conclusions, we considered not only the direction and strength of the findings, but also the quality of the evidence given the limitations of the study.

The primary limitation of our analysis is that it does not rely on random assignment—the gold standard for evaluations—because CMS selected states based on pre-model utilization levels. A further limitation is that the states selected for the Year 1 cohort had particularly high rates of RSNAT service use before RSNAT-PA went into effect. This made it difficult to find a set of comparison states that could serve as an appropriate counterfactual. As a result, the analysis could yield biased impacts if the comparison states did not experience similar changes over the study period to what the model states would have experienced in the absence of RSNAT-PA. Recognizing this possibility, we took various steps to attempt to remove any major source of bias in our estimates. These efforts included (1) selecting a credible comparison group from multiple states, (2) weighting to make the comparison states closely match our model states, (3) verifying parallel baseline trends in outcome variables, and (4) using difference-in-differences regression models to adjust for and difference out potentially confounding factors.

Objective 1: Utilization and expenditures

The model was highly effective in reducing RSNAT service utilization and expenditures for beneficiaries with ESRD and/or pressure ulcers. Both utilization and expenditures decreased by more than 60 percent. The model also reduced total Medicare ambulance use and expenditures for Medicare ambulance services. We found that RSNAT-PA produced total Medicare savings of $650 million during the observed period of operation.

Estimated impacts on RSNAT use and expenditures were similar (in both direction and level of statistical significance) for the states that began in Year 1 and those that began in Year 2. But the magnitudes of impacts were generally much larger for the Year 1 model states. This result is not surprising, given that the rate of RSNAT use was much higher in Year 1 states than in Year 2 states before the model was implemented. However, the estimated impact on total Medicare expenditures was greater for the Year 2 states than for the Year 1 states.

Objective 2: Quality of care and access to care

Overall, the findings suggest that the model had no adverse effects on quality of care or access to care. We found no increases in emergency department use, hospitalization, or death among

model state beneficiaries relative to comparison state beneficiaries. While we saw some small changes in dialysis use among beneficiaries with ESRD, we found no evidence of reduced access to care resulting in increased hospitalization for complications of ESRD.

Objective 3: Suppliers

RSNAT-PA did affect suppliers. We found a 50 percent reduction in the number of RSNAT suppliers per 100,000 beneficiaries in the model states upon implementation. The decrease was concentrated almost entirely in the Year 1 states, with the Year 2 states seeing a much smaller reduction. The number of RSNAT suppliers in Year 1 states was much higher than the number in Year 2 and comparison states at the start of the study period, but by 2018 had declined to levels that were comparable to Year 2 and comparison states.

Suppliers that stopped billing Medicare for ambulance transportation before RSNAT-PA went into effect were smaller and less rural, and they depended much more heavily on payments for RSNAT services than suppliers that continued to bill Medicare after implementation of the model. Suppliers that continued to supply ambulance services to Medicare beneficiaries in the first year after model implementation, but not after that, also relied more heavily on RSNAT than suppliers that stayed in the Medicare program long term. The former group tended to be larger than suppliers that exited before the model start date. They may have expected that they could absorb reduced payments under the model, but ultimately chose to exit the Medicare program once RSNAT-PA was implemented.

Objective 4: Claims denials

The rate of claims denials rose after the model began but fell back toward the baseline rate over time. The trend toward the baseline rate could be attributed to suppliers learning how to submit claims that were less likely to be denied, or to fewer submissions by non-compliant suppliers, who may have been more likely to exit Medicare in the model states over time..

Objective 5: Feasibility and Implications

Our findings suggest that scaling up the model could produce savings for Medicare, but those savings would likely be smaller than what was observed under the model. Although utilization and expenditures for RSNAT declined dramatically in both Year 1 and 2 states among beneficiaries with ESRD and/or pressure ulcers, these impacts were considerably smaller for the Year 2 states. This finding is not surprising, given how unusual the Year 1 states were in their rates of RSNAT use before implementing the model. The potential for RSNAT cost savings was especially high for the Year 1 states, which is why CMS selected them. If the model were implemented nationally, savings would likely be more similar to what we found for the Year 2 states rather than to the overall results for the two cohorts of states combined.

In addition, our supplier analysis suggests that ambulance suppliers in the model states might have depended more on RSNAT for their revenue than suppliers in other states. As a result, the impacts and experiences in these states might not be generalizable to other states or the rest of

the Medicare program. The findings for the Year 2 states could provide a more reliable guide to what might occur if CMS extended prior authorization to more states.

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GLOSSARY OF TERMS

Baseline. The period of time immediately before the implementation of a policy or treatment. In this case, the baseline is the time period from 2012 to the implementation of the RSNAT-PA model.

Beneficiary. An individual enrolled in and receiving services from Medicare.

Centers for Medicare & Medicaid Services (CMS). The federal agency that runs the Medicare program. In addition, CMS works with the states to run the Medicaid program. CMS works to make sure that the beneficiaries in these programs are able to receive high quality health care.

Claim. Request for payment from a provider to CMS for a Medicare-covered service.

Claims data. Data on the claims submitted to CMS for Medicare-covered services. Claims data provide detailed information on procedures performed by providers.

Cohort. A population group that shares a common property, characteristic, or event, such as a year of birth or year of marriage. In this instance, a cohort refers to the beneficiaries residing in a group of states for which the prior authorization model went into effect at the same time.

Comparison group. A group or population not affected by a policy change or intervention, sometimes called a control group. In this case, the comparison group is the beneficiaries residing in a group of states where RSNAT-PA has not been implemented. The comparison group is used to measure the impact of RSNAT-PA on the beneficiaries residing in the states where RSNAT-PA was implemented.

Compliance. Adhering to an expectation, usually a rule or law. Something is said to be compliant or in compliance if it adheres to an established set of standards.

Confounding factor. A confounding factor is an effect that alters the outcomes measured in a study that is not known or accounted for in the analysis and that affects the intervention and comparison groups differently. Confounding factors can result in incorrect estimates of the intervention effect. For example, if some of the model states passed legislation that lowered the cost of RSNAT services after RSNAT-PA was implemented, that would be a potential confounding factor.

Counterfactual. An expectation of what would have happened in the intervention group in absence of a policy change or intervention. In this case, the counterfactual is the outcomes we would expect to see in the RSNAT-PA states during the study period if the model had not been implemented.

Descriptive analysis. An examination intended to provide a basic description, not a detailed analysis. In the context of this report, descriptive analysis explains the basic characteristics of the populations examined.

Difference-in-differences. A quasi-experimental technique that evaluates the differences in a comparison group and an intervention group following some intervention or policy change. This approach adjusts for expected differences between the two groups as observed before the intervention.

Expenditure. The issuance of checks, disbursement of cash, or electronic transfer of funds made to settle an expense regardless of the fiscal year the service was provided or the expense was incurred.

Fee-for-service. A health care payment model in which providers are reimbursed for individual services provided to a beneficiary.

Generalizability. The extent to which the results obtained from one sample can be applied to a more widespread population.

Improper payments. Payments for services that did not occur or that do not meet Medicare requirements for a particular service. In the case of RSNAT-PA, an improper payment is a payment made for RSNAT service that did not occur, does not meet the requirements for medical necessity, or was not documented.

Matching. A statistical technique employed to select a comparison group from some larger population. Matching is often used to minimize baseline differences in characteristics between a intervention group and a comparison group.

Mean. A measure of the average value of a sample. The mean is calculated by adding all data points in a sample and then dividing the sum by the number of data points in the sample.

Measure. A standardized way to assess an outcome of interest.

Moratorium. A declared suspension of an activity for some period of time.

Multivariate analysis. Statistical analysis that uses the relationships between more than one variable. This study employs multivariate analysis to measure several outcomes of interest, such as RSNAT utilization, Medicare expenditures, and probability of death.

Outcome. A measurable or observable product of a particular process.

Prior authorization. The requirement that a service receive approval from health care payers to bill for services before the service is provided.

Probability. The likelihood of something occurring.

Proxy. An observable outcome used in place of an outcome that cannot be measured. The proxy outcome is known or thought to be similar to the unmeasured outcome.

Qualitative. Describing characteristics or measuring effects with little or no quantitative data.

Statistically significant. A difference in outcomes between two groups is said to be statistically significant if it is unlikely to have occurred due to chance.

Utilization. Making use of a particular service.

Validity. The extent to which a measurement of some characteristic actually corresponds with that characteristic.

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