Incentive Misalignment in Ambulance Reimbursement: An Analysis of Medicare Payment Systems *

Meghan I. Esson†

Abstract

Medicare's ambulance reimbursement policies require (1) patient transportation and (2) medical necessity for reimbursement. Using over 7.7 million 911 EMS activations and a regression discontinuity design at the age 65 Medicare eligibility threshold, I find that these policies misalign incentives, leading to increased ambulance transports and upcoding. Conservatively, Medicare's transportation requirement led to 36,500 extra transports annually and has cost Medicare an estimated $350 million over 5 years. Additionally, Medicare's medical necessity criterion results in strategic upcoding by providers, with patients being more likely to be assigned condition codes that are reimbursable by Medicare but difficult to verify at the hospital, while no consistent change is observed for codes that are both reimbursable and easily verifiable. This practice introduces significant inefficiencies in emergency departments through unnecessary testing and improper triaging, which can be costly to insurers and negatively impact patient health. These findings have significant policy implications for the efficient functioning of emergency medical services, highlighting the need to reevaluate Medicare's reimbursement approach to better align provider incentives with patient care, mitigate moral hazard, and control costs.

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†**Contact Author** Tippie College of Business, Department of Finance, University of Iowa, Iowa City, IA, (319)-467-3142, meghan-esson@uiowa.edu

1 Introduction

Designing effective public health insurance reimbursement policies is a complex challenge for policymakers. They must balance program sustainability, provider stability, and access to quality care for the insured. Poorly designed reimbursement schemes can distort provider incentives, leading to increased costs and potential harm to patients (Lee and Zenios, 2012; Ata et al., 2013; Jin et al., 2022).[1] Understanding these incentives is especially crucial for Medicare – the largest U.S. payer and one of the largest insurance programs in the world – which faces rising costs, provider dependence, and concerns about future financial viability (Hakkio and Wiseman, 2006; Van de Water, 2020).[2]

In this paper, I examine whether Medicare's reimbursement requirements for ambulance services misalign provider incentives. Medicare's two key reimbursement criteria are: (1) the patient must be transported, and (2) the transport must be for a medically necessary reason.[3] Using over 7.7 million 911 EMS activations and exploiting the discontinuity in Medicare eligibility at age 65, I first find that Medicare's transportation requirement induces moral hazard from both patients and providers, leading to an increase in costly ambulance transports.[4,5] I then show that Medicare's medical necessity requirement results in the upcoding to conditions that meet reimbursement standards, particularly for cases which are difficult to verify upon arrival at the hospital.

The misaligned incentives from each reimbursement requirement have distinct financial impacts on Medicare. The transportation requirement results in approximately 36,500 extra transports annually, costing Medicare around $71 million each year, representing 1.5% of its total ambulance spending for 911 transports alone.[6] The medical necessity requirement leads to broader, indirect costs throughout the healthcare system, including unnecessary diagnostic tests and improper triaging at the emergency department. While these indirect costs are more challenging to quantify, they likely contribute to significant inefficiencies and increased Medicare expenditures. These findings

[1] For additional examples, see So and Tang (2000) (pharmaceutical industry), Adida et al. (2017) (fee-for-service vs bundled payment systems), and Savva et al. (2023) (DRG-based reimbursement).

[2] Recent reports highlighting these concerns include AP News (2024) and Social Security Administration (2024).

[3] The terminology of "necessity" comes from CMS. I do not take a stand on the necessity of these transports.

[4] This discontinuity has been used to examine Medicare's impact in other healthcare settings such as breast cancer diagnosis and survival (e.g., Decker and Rapaport, 2002; Decker, 2005), healthcare utilization (e.g., Lichtenberg, 2002; Card et al., 2008), and mortality (e.g., Card et al., 2009).

[5] Moral hazard in this context refers to the increased use of a service when it is covered by insurance (Pauly, 1968).

[6] Medicare spent approximately $4.6 billion on ambulance services in 2016 (CMS, 2012-2016).

underscore the need for policymakers to carefully reevaluate Medicare's ambulance reimbursement policies to better align incentives with efficient healthcare delivery and cost containment.

Medicare is the largest payer for ambulance services in the US, covering nearly one-third of 911 activations (NEMSIS, 2012-2016). Ambulances deliver more Medicare patients to the emergency department than any other payer (Squire et al., 2010; Meisel et al., 2011). Given its central role, Medicare heavily influences the financial performance of ambulance companies, which in turn affects provider decisions. However, Medicare's strict reimbursement criteria, designed to control costs while ensuring access to essential emergency care, define the ambulance benefit as a *transportation* benefit. This means that for reimbursement, a 911-activated encounter must result in a "medically necessary" transport to a hospital (CMS, 2017).[7] Encounters that do not involve a medically necessary transport are not reimbursed, regardless of the costs incurred by the ambulance company. This contrasts with the policies of many private insurers, which often reimburse ambulance companies for the cost of arriving at a scene and assessing a patient, even if no transport occurs.[8,9]

In addition to Medicare's reimbursement policies, EMS providers must navigate challenges from state and federal regulations, such as the Emergency Medical Treatment and Labor Act (EMTALA). Under EMTALA, EMS providers are required to respond to and provide care to a 911 caller, regardless of the patient's ability to pay – even in situations where it is clear the encounter will not be reimbursable by Medicare.[10] While providers have some recourse for these non-reimbursed services through mechanisms like balance billing, these measures often fail to fully cover the costs incurred. EMTALA, when coupled with Medicare's reimbursement structure, creates a strong incentive for EMS providers to transport patients more frequently and, in some cases, to upcode conditions to meet Medicare's medical necessity requirement and ensure reimbursement.

[7] Medicare's reimbursement rule requires a medically necessary transport to an appropriate healthcare facility. In the context of a 911 call, a hospital is considered the appropriate facility (CMS, 2017). For transport to be considered medically necessary, the patient must (1) require care at a hospital and (2) be unable to be transported by any other means.

[8] Not all private insurers reimburse for non-transport emergency encounters, which may bias my estimates towards zero. However, some insurers, including the largest health insurer UnitedHealthcare, did reimburse for non-transport encounters during the study period (see Online Appendix F). Since 2018, more large private insurers have started to reimburse for non-transport encounters (National Association of Emergency Medical Technicians, 2017).

[9] I focus on 911 ambulance encounters for identification purposes. However, Medicare imposes strict reimbursement criteria for other ambulance services as well. For example, interfacility transport is only reimbursed if the patient is "bed-confined" (CMS, 2017). Therefore, these misaligned Medicare incentives likely extend beyond 911 encounters.

[10] For more details, see the American College of Emergency Physicians' EMTALA information page at https://www.acep.org/News-Media-top-banner/EMTALA/.

However, significant countervailing forces may discourage such behavior. There are harsh penalties for upcoding, including substantial fines, legal action, and even the potential loss of Medicare as a payer, which poses a serious risk to EMS providers.[11] Additionally, an increase in transports could jeopardize an ambulance company's ability to meet state-mandated response time requirements, which can lead to financial penalties or even the loss of their operating licenses. These conflicting incentives create uncertainty about whether Medicare's reimbursement policies would increase transports and upcoding, underscoring the need for empirical investigation.

To assess whether the incentives from Medicare's reimbursement policies outweigh existing countermeasures, I use data from the 2012-2016 National Emergency Medical Services Information System (NEMSIS), which includes over 7 million 911 EMS encounters. Since Medicare eligibility is based on age, and age can influence healthcare decisions, it is important to address potential endogeneity. I employ a regression discontinuity design, leveraging the clear eligibility cutoff at age 65. This quasi-experimental approach allows for causal identification by comparing outcomes for patients just below and just above 65, who should be nearly identical except for their Medicare eligibility. This design enables an evaluation of whether Medicare's two reimbursement components – the transportation requirement and the medical necessity criterion – misalign incentives, leading to increased transports and upcoding.

I first examine the impact of Medicare's transportation requirement on EMS provider treatment and transportation decisions. The results show that Medicare-eligible patients are 2 percentage points more likely to be treated and transported by EMS than ineligible patients, representing a 2.5% increase over the baseline transport rate of 75%. Further analysis of alternative treatments and transport options indicates that this increase in ambulance transportation is driven by moral hazard – Medicare patients are significantly less likely to refuse care or require no treatment once they have insurance.

This moral hazard stems from two sources: ambulance providers and patients. Twenty percent of the increase in transports is from the decrease in patients requiring no treatment, which is directly attributable to provider moral hazard. The provider moral hazard is a direct result of Medicare's reimbursement structure, which incentivizes transport over on-scene treatment. The

[11] Legal actions against ambulance companies are not uncommon and can be costly. For example, in June 2002, a lawsuit against American Medical Response resulted in the company repaying Medicare $20 million (Kesselheim and Studdert, 2008).

remaining 80% of the increase in transports is due to patient moral hazard, as patients are less likely to refuse transport under Medicare. Patient moral hazard arises from two sources: reduced cost-sharing under Medicare and the transportation requirement for reimbursement. Patients may insist on being transported if they know – or are informed – that Medicare will not cover the encounter without transport.

Understanding the source of this patient moral hazard is critical. If the increased transports are primarily due to reduced cost-sharing, Medicare's reimbursement structure does not create an additional financial burden, as these transports would occur regardless. However, if the transportation requirement is driving the increase, this results directly from Medicare's policy. To disentangle these effects, I use the ambulance services elasticity estimate of -0.07 from Ellis et al. (2017) and the observed 15.5% decrease in out-of-pocket costs for ambulance services under Medicare. This combination suggests that 60% of the decrease in patient refusal of care is due to lower cost-sharing, while the remaining 40% is attributable to the transportation requirement. Therefore, roughly half (46%) of the increase in transports is due specifically to the moral hazard induced by Medicare's *transportation* requirement.

This reveals a significant incentive misalignment in Medicare's transportation requirement. While the policy aims to control costs by limiting transports, it paradoxically leads to more transports, particularly to high-cost healthcare facilities. This misalignment not only increases costs but also strains the healthcare system, potentially worsening emergency department overcrowding and reducing ambulance availability for true emergencies. A conservative estimate suggests that this misalignment costs Medicare $70 million per year from the extra 911 ambulance transports alone. Importantly, this financial estimate does not account for any broader healthcare inefficiencies or potential negative patient outcomes resulting from increased system strain.

Next, I assess the impact of Medicare's medical necessity requirement on the condition codes assigned to patients. I focus on condition codes deemed reimbursable by Medicare, dividing them into two categories: those that are difficult for an emergency department to verify (e.g., the patient was unconscious/dizzy or had non-traumatic chest pain) and those that are easily verifiable (e.g., a protruding fracture).[12] As a placebo test, I also examine whether there is a discontinuity in the

[12]The distinction between easily and non-easily verifiable conditions is crucial because hospitals also submit documentation for reimbursement. If the hospital's documentation contradicts the ambulance's report, Medicare is more likely to investigate.

use of a condition code that is not considered medically necessary: non-traumatic headache. The results show that Medicare-eligible patients are 1 percentage point more likely to be assigned non-verifiable but reimbursable condition codes than those who are not Medicare-eligible. In contrast, there is little to no evidence of a similar discontinuity for verifiable medically necessary condition codes or for the placebo condition code. This pattern suggests that EMS providers are engaging in strategic coding to meet Medicare's medical necessity requirement.

Medicare's medical necessity requirement incentivizes providers to disproportionately assign reimbursable condition codes that are difficult to verify at the hospital. While this behavior imposes costs on Medicare, quantifying the costs of this incentive misalignment is challenging. The financial impact of upcoding is not tied directly to the transport itself, as these transports likely would have occurred regardless due to Medicare's transportation requirement. Instead, the financial burden comes from the broader healthcare system inefficiencies caused by the upcoded transports. The most significant costs of Medicare's medical necessity rule arise from the externalities that upcoding creates for emergency departments.

Upcoding can exacerbate inefficiencies in emergency departments by leading providers to overestimate a patient's severity, which can result in several costly consequences: (1) unnecessary and expensive diagnostic tests, which Medicare ultimately pays for, (2) improper triaging, which can delay appropriate care, worsen patient health outcomes, and further increase costs for Medicare and other insurers, and (3) the misallocation of resources, as emergency departments may prioritize patients who appear to be in more critical condition than they actually are. These inefficiencies, directly linked to Medicare's medical necessity rule for ambulance services, are undoubtedly costly but difficult to quantify. The $350 million estimated cost from the transportation requirement is, therefore, a lower bound on the true costs associated with the incentive misalignment in Medicare's ambulance reimbursement rules, as it does not account for the additional costs stemming from the medical necessity requirement.

To further validate my findings, I perform a series of tests, including sorting checks, covariate balance tests, and sensitivity analyses on model specifications and condition code classifications. These tests confirm the validity of the regression discontinuity design and show that the results are robust to different model specifications and condition code categorizations. Additionally, I conduct a placebo analysis at alternative age thresholds, which confirm that the observed effects

are uniquely associated with Medicare eligibility at age 65, rather than other age-related factors or underlying non-linearities in the data.

This paper contributes to three primary literatures. First, it adds to the literature on the unintended consequences of Medicare reimbursement schemes. Previous studies have examined various healthcare sectors, including hospices, hospitals, skilled nursing facilities, and non-emergency transportation of dialysis facilities (e.g., Ata et al., 2013; Gowrisankaran et al., 2019; Arifoğlu et al., 2021; Jin et al., 2022; Eliason et al., 2021). This study extends the literature by focusing on emergency medical services, an area previously unexplored in this context.

Second, I add to the literature on detecting and estimating Medicare fraud and abuse. Existing research has explored upcoding and fraud to increase reimbursement under Medicare Advantage fee-for-service plans (Geruso and Layton, 2015), in hospitals (Silverman and Skinner, 2004; Dafny, 2005), physician services (Fang and Gong, 2017; Brunt, 2011), and skilled nursing facilities (Bowblis and Brunt, 2014; He et al., 2020). Other studies have shown that changes in Medicare reimbursement can affect service volume (Eldenburg and Kallapur, 1997), although results vary across different healthcare services (Becker et al., 2005; Schonberger et al., 2016). This paper is the first to examine these issues in the ambulance industry.

Third, this paper contributes to the literature on Medicare coverage and moral hazard. While prior research has investigated moral hazard in various healthcare contexts, such as physician visits, prescription drug spending, and overall healthcare expenditures (e.g., Dave and Kaestner, 2009; Coulson et al., 1995; Pauly, 2004; Fang et al., 2008; Keane and Stavrunova, 2016; Einav et al., 2013), this study is the first to examine Medicare-induced moral hazard specifically in the ambulance industry. By focusing on this critical yet underexplored component of healthcare, this paper offers new insights into the spillover effects that Medicare can have on other sectors of the healthcare system.

This paper also has direct policy implications for Medicare and emergency medical services. I reveal that Medicare's transportation requirement unintentionally incentivizes costly transports, contributing to Medicare's financial strain at a time when the program faces potential shortfalls within the next two decades (Social Security Administration, 2024).[13] Furthermore, Medicare's

[13]Importantly, I am unable to perform a full welfare analysis and therefore cannot say whether the benefit provided for the additional transports outweighs the additional cost to Medicare.

medical necessity requirement encourages strategic coding behavior, which has direct implications for emergency department efficiency and hospital costs. Though not directly examined in this study, these findings raise concerns about potential negative health spillovers: an increase in potentially avoidable transports may reduce ambulance availability, which could increase response times for true emergencies. An increase in potentially avoidable transports may also contribute to emergency department overcrowding, which diminishes care in the hospital setting. Upcoding can impact hospital triaging, potentially delaying necessary care and worsening patient health outcomes. By shedding light on the incentive misalignment of current reimbursement policies, this research underscores the need for a careful reevaluation of Medicare's reimbursement approach for ambulance services to ensure both financial sustainability and optimal patient care.

2 Institutional Details

2.1 CMS Service Levels:

The Centers for Medicare and Medicaid Services (CMS) categorizes ground ambulance encounters into four service levels: Basic Life Support (BLS), Advanced Life Support (ALS), Paramedic Intercept (PI), and Specialty Care Transport (SCT). BLS encounters typically involve lower-acuity care, while ALS is for moderate to high-acuity situations.[14] PI and SCT are inherently transport encounters; PI occurs when a paramedic from one agency meets an ambulance from another to provide necessary ALS care during transport, and SCT involves the transfer of critically ill patients between facilities requiring care beyond standard paramedic capabilities.[15]

2.2 Medicare Ambulance Reimbursement Criteria:

CMS imposes strict reimbursement criteria for ground ambulance encounters involving Medicare patients. The ambulance benefit is fundamentally a transportation benefit – Medicare reimburses an ambulance provider only if the encounter results in a "medically necessary" transport to an "appropriate" healthcare facility (CMS, 2017). Ground EMS encounters that do not involve a

[14] Subcategories include BLS, BLS-Emergency, ALS-Level 1, ALS-Level 1 Emergency, and ALS-Level 2, with increasing acuity levels (The Medicare Payment Advisory Commission, 2016).

[15] PIs and SCTs are excluded from this analysis due to their guaranteed transport nature, which differs significantly from standard EMS encounters which could be influenced by Medicare reimbursement rules.

medically necessary transport, or that transport to an inappropriate facility, are not reimbursed by Medicare, regardless of the costs incurred by the ambulance company. In contrast, some private insurers, including the largest private insurer UnitedHealthcare, reimburse ambulance companies for arriving at a scene and assessing a patient even without transport.[16,17]

Medicare defines medical necessity as situations where the patient cannot be safely transported by other means (e.g., taxi, private vehicle). Although CMS does not list specific condition codes that guarantee reimbursable transport, it provides guidance on categories of conditions likely to be considered medically necessary. These categories, outlined in Table 1, include a range of conditions and situations necessitating specialized transport, such as emergencies from accidents or acute illness, cases requiring patient restraints or involving unconscious patients, and instances requiring immediate medical intervention during transport. While CMS emphasizes that these categories are not exhaustive and do not necessarily guarantee reimbursement, they guide providers in assessing medical necessity and are critical in analyzing potential upcoding practices.

Table 1: Medicare Categories for Medically Necessary Ambulance Services

Categories	Description
1	Transported in an emergency situation (i.e., result of accident, injury or acute illness)
2	Needed to be restrained to prevent injury to the beneficiary or others
3	Was unconscious or in shock
4	Required oxygen or other emergency treatment during transport to the nearest facility
5	Exhibits signs and symptoms of acute respiratory distress or cardiac distress such as shortness of breath or chest pain
6	Exhibits signs and symptoms that indicated the possibility of acute stroke
7	Had to remain immobile because of a fracture that had not been set or the possibility of a fracture
8	Is experiencing severe hemorrhage
9	Could be moved only by stretcher
10	Patient was bed-confined before and after ambulance trip

Note: These Medicare Categories are derived from the Medicare Ambulance Services Fact Sheet by CGS Administrators, LLC (2017), copyright ©2017 CGS Administrators, LLC and the American Medical Association.

2.3 Impact of EMTALA on Ambulance Services:

This study focuses on 911 ground BLS and ALS ambulance encounters, where the "appropriate" healthcare facility is typically a hospital.[18] These encounters are the setting for this study

[16] Please see Online Appendix F for an example of United's policy for ambulance reimbursement.

[17] If private insurers follow Medicare's reimbursement policies, this should have an attenuating bias.

[18] Other potential transport destinations include a nursing home, the patient's home, another EMS responder (ground or air), a medical office/clinic, jail, the morgue, or another destination.

because they are governed by both Medicare's reimbursement rules and the Emergency Medical Treatment and Labor Act (EMTALA). Enacted in 1986, EMTALA requires ambulance providers to respond to 911 calls and provide treatment, regardless of the patient's ability to pay or whether the encounter is reimbursable. EMTALA, therefore, mandates that ambulance providers respond and treat patients even in cases where reimbursement may not occur.[19] Additionally, EMTALA prohibits 911 dispatchers from inquiring about a patient's insurance status, although they can ask about age, which can be used to determine Medicare eligibility.

3 Data

3.1 Data Source and Sample Selection:

This analysis uses data from the 2012 to 2016 National Emergency Medical Services Information System (NEMSIS), which includes individual EMS activations from up to 9,993 agencies across 49 U.S. states and territories. NEMSIS provides comprehensive encounter level information, including patient characteristics, call specifics (e.g., timing, condition codes, etc.), and treatments provided.[20]

This study focuses on 911 group ambulance encounters for individuals aged 50 to 79, a range that captures both pre-Medicare and Medicare-eligible populations, which is essential for the regression discontinuity design. This analysis is restricted to 911 encounters due to their unexpected nature, which prevents ambulance companies from preparing in advance. Additionally, Medicare's reimbursement rules apply to these encounters, and EMTALA regulations mandate response and treatment regardless of reimbursement potential.

Out of 18,996,266 ground 911 ambulance encounters for this age group, I focus on ALS and BLS encounters, excluding paramedic intercept and specialty care transport cases, as these inherently involve transportation and differ in decision-making processes.[21]This refinement leaves me with 18,956,699 encounters. I further restrict my analysis to encounters where (1) the exact age

[19]EMTALA ensures that patients receive the appropriate level of care, irrespective of their ability to pay. In 911 settings, if the patient is transported, the hospital is typically considered the appropriate level of care. As shown in Table 4, over 90% of transported patients are taken to the hospital aligning with EMTALA and Medicare reimbursement rules.

[20]Please refer to the NEMSIS website for more information https://nemsis.org/using-ems-data/request-research-data.

[21]There were 35,292,525 total 911 encounters for this age range, including air ambulance and unknown service levels. Air ambulance encounters were excluded due to different reimbursement rules, and unknown service levels were removed because the applicable reimbursement regime is unclear.

measurement (i.e., year, month, day) is known, as age in years is necessary for the regression discontinuity, and (2) if treatment was provided, the primary payer information was Medicare, self-billed, not-billed, or private insurance.[22] The final dataset consists of 7,793,789 EMS activations, representing 41% of ALS and BLS ambulance encounters for individuals aged 50 to 79.

3.2 Summary Statistics: Transportation Requirement

Table 2 presents the summary statistics for all EMS activations, which will be used to examine the incentives from Medicare's transportation requirement. Table 2 compares the full sample (ages 50-79), Medicare-ineligible individuals (ages 50-64), and Medicare-eligible individuals (ages 65-79).

Table 2: Summary Statistics: 911 Ambulance Encounters

Variable	Full Sample:		Medicare Ineligible:		Medicare Eligible:	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Dependent Variables:						
Treated-Transported by EMS (%)	77.02	42.07	74.11	43.81	79.55	40.33
Patient Refused Care (%)	14.61	35.32	17.07	37.62	12.46	33.03
Treated EMS-Released (%)	1.39	11.73	1.42	11.84	1.37	11.63
No Treatment Required (%)	2.62	15.96	2.74	16.32	2.51	15.65
Other Variables:						
Age	65.04	8.57	57.10	4.28	71.95	4.34
Advanced Life Support (%)	66.69	47.13	66.10	47.34	67.20	46.95
Payer - Medicare (%)	43.62	49.59	27.82	44.81	57.37	49.45
Payer - Private Insurance (%)	26.40	44.08	33.26	47.11	20.42	40.31
Payer - Self Pay (%)	10.87	31.12	16.85	37.43	5.66	23.11
Race - White (%)	60.81	48.82	57.05	49.50	64.07	47.98
Region - East (%)	43.91	49.63	44.80	49.73	43.13	49.53
N	7,793,789		3,627,248		4,166,541	

Note: This table shows the summary statistics for the 2012 to 2016 NEMSIS data of 911 ALS or BLS encounters for patients ages 50 to 79. This table is separated by encounters based on Medicare eligibility. A more detailed summary statistics table can be found in Online Appendix A.

Overall, 77% of encounters resulted in patient treatment and transport by EMS, 15% involved patients refusing care, 3% required no treatment, and less than 2% were treated without transport.[23] The high rate of EMS transport underscores the potential for moral hazard, even among private insurers, who are increasingly removing transportation requirements from their reimburse-

[22] This criterion excludes ALS/BLS encounters where the primary payer was unknown or listed as Medicaid/Worker's Comp/Other government. Unknown payers were removed due to potential data quality issues, and Medicaid/Worker's Comp/Other government were excluded as they represent a less clear control group for Medicare reimbursement. These payers account for only 7% of ALS/BLS 911 encounters for individuals aged 50-79.

[23] Comprehensive summary statistics tables, including those for all encounters and those resulting in transport, that include all summary statistics on the full treatment/transportation choices, payer, race, and region are available in Online Appendix A.

ment policies (National Association of Emergency Medical Technicians, 2017). Therefore, any findings of increased transportation are likely a lower bound. The average patient age was 65, with 57% of patients being Medicare-eligible. Medicare was the primary payer for 44% of encounters, private insurance for 26%, and self-pay for 11%.[24,25] Most patients were white, 67% were ALS encounters, and nearly 61% of encounters occurred in the East National Association of State Emergency Medical Services (NASEMSO) region.[26] Notably, Medicare-eligible patients had higher treatment and transport rates and lower care refusal rates compared to Medicare-ineligible patients, suggesting that Medicare's transportation requirement may contribute to moral hazard.

3.3 Summary Statistics: Medical Necessity Criteria

To investigate potential unintended consequences of Medicare's medical necessity reimbursement component, I identify which condition codes are likely to meet Medicare's medical necessity criteria and may thus be susceptible to upcoding. Utilizing detailed condition codes from NEMSIS, I categorize conditions based on Medicare's guidelines into those that are likely reimbursable and easily verifiable (e.g., penetrating fracture) versus those that are not (e.g., dizziness) upon hospital arrival. Table 3 outlines the conditions deemed likely reimbursable by Medicare, their verifiability status upon arrival at the emergency department, and their corresponding Medicare reimbursable categories as detailed in Section 2.2.

Table 4 presents summary statistics for EMS activations that resulted in patient transport, which will be used to analyze the impact of Medicare's medical necessity requirement. The first two columns represent the full sample of individuals aged 50-79, the middle columns focus on Medicare-ineligible individuals (aged 50-64), and the final columns on Medicare-eligible individuals (aged 65-79). Overall, 11% of encounters involved conditions that were reimbursable but non-

[24]The NEMSIS data does not directly indicate the insurance status of the patient. The "primary payer" variable does not necessarily reflect insurance status. For example, claim denials may result in patients appearing uninsured (i.e., self-pay or not-billed). Denial of claims and the presence of immigrants explain why Medicare as the primary payer is not 100% for all Medicare-eligible individuals. However, over 95% of the population over the age of 65 has Medicare (SHADAC, 2024).

[25]Notably, even in the Medicare-ineligible group (ages 50-64), Medicare is the primary payer for 28% of encounters. While Medicare eligibility generally begins at age 65, certain individuals under 65 can qualify for Medicare. This includes people with disabilities who have received Social Security Disability Insurance (SSDI) for 24 months, individuals with End-Stage Renal Disease (ESRD), and those with Amyotrophic Lateral Sclerosis (ALS). However, less than 9% of the population aged 55-64 have Medicare (SHADAC, 2024)

[26]The National Association of State EMS Officials regions are US states/territories organized by the National Association of State EMS officials based on EMS similarity and need. For a visual representation of NASEMSO regions, please refer to https://nasemso.org/about/state-agencies/.

Table 3: Selected Condition Codes: Verifiability and Medicare Reasons

Code	Description	Verifiability	Medicare Category
8003	Abnormal Cardiac Rhythm/Cardiac Dysrhythmia (ALS-427.9)	Non-Verifiable	5
8009	Respiratory Arrest (ALS-799.1)	Non-Verifiable	1, 4, 5
8011	Cardiac Arrest-Resuscitation in Progress (ALS-427.5)	Verifiable	1, 3, 4, 5
8012	Chest Pain (non-traumatic) (ALS-786.50)	Non-Verifiable	5
8017	Convulsions/Seizures (ALS-780.39)	Verifiable	1, 3
8042	Unconscious/Syncope/Dizziness (ALS-780.02)	Non-Verifiable	3
8047	Other Trauma (penetrating extremity) (BLS-880.0)	Verifiable	1, 8
8048	Other Trauma (amputation digits) (BLS-886.0)	Verifiable	1, 7, 8
8049	Other Trauma (amputation other) (ALS-887.4)	Verifiable	1, 7, 8, 9
8063	IV Meds Required (ALS-No ICD code provided)	Non-Verifiable	4
8065	Suctioning/Oxygen/IV fluids required (BLS-496.0)	Non-Verifiable	4

Note: This table summarizes condition codes likely to be reimbursable by Medicare, categorized by their verifiability upon arrival at the emergency department, and the relevant Medicare categories associated with each code. For detailed descriptions of the Medicare Reason Categories, see Table 1 in Section 2.2. A broader set of condition codes is used for a sensitivity check, which is discussed in Section 6.4.

verifiable (i.e., prone to upcoding), 2% involved reimbursable and verifiable conditions, and less than 1% involved non-traumatic headaches – a placebo condition that is never reimbursed by Medicare.[27] Table 4 also shows that over 90% of transported patients were taken to a hospital, consistent with EMTALA regulations and Medicare reimbursement policies, which underscores the preference for the most costly healthcare option. Comparisons between Medicare-eligible and ineligible groups reveal that Medicare-eligible patients exhibit a slightly higher rate of non-verifiable reimbursable codes and a lower rate of verifiable reimbursable codes, suggesting potential upcoding to meet Medicare's medical necessity requirement. The difference in Medicare as the primary payer reflects the eligibility threshold and is critical for the regression discontinuity design.

[27] Non-verifiable condition codes are key in identifying potential upcoding practices by EMS providers. To ensure robustness, I conducted a sensitivity analysis using AI to categorize condition codes as either likely reimbursable or not, and as easily verifiable or not at the emergency department. The results are consistent across both manual and AI-driven categorizations. See Appendix A for a detailed description of the AI categorization, and Table A2 in Online Appendix A for the corresponding summary statistics.

Table 4: Summary Statistics: EMS Transported Encounters

Variable	Full Sample:		Medicare Ineligible:		Medicare Eligible:	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Dependent Variables:						
Non-Verifiable Reimburseable Codes (%)	10.83	31.07	10.42	30.55	11.16	31.49
Verifiable Reimbursable Codes (%)	1.61	12.59	2.00	13.99	1.30	11.32
Non-Traumatic Headache (%)	0.64	7.98	0.75	8.62	0.55	7.41
Other Variables:						
Age	65.35	8.53	57.17	4.27	71.98	4.34
Destination - Hospital (%)	91.98	27.17	92.87	25.74	91.25	28.25
Advanced Life Support (%)	71.36	45.21	71.16	45.30	71.52	45.13
Payer - Medicare (%)	54.15	49.83	35.98	48.00	68.88	46.30
Payer - Private Insurance (%)	32.58	46.87	42.73	49.47	24.35	42.92
Payer - Self Pay (%)	12.28	32.82	20.15	40.11	5.89	23.55
Race - White (%)	61.48	48.66	57.70	49.40	64.54	47.84
Region - East (%)	40.53	49.10	41.41	49.26	39.82	48.95
N	6,002,607		2,687,994		3,314,613	

Note: This table shows the summary statistics for the 2012 to 2016 NEMSIS data of 911 ALS or BLS encounters where EMS transported the patient for patients ages 50 to 79. This table is separated by encounters based on Medicare eligibility. A more detailed summary statistics table can be found in Online Appendix A.

4 Methods and Identification

To determine whether Medicare's transportation and medical necessity requirements misalign incentives, I use the age-based cutoff in Medicare eligibility at age 65 as a basis for identification through a regression discontinuity (RD) design. This section explains the RD approach, its relevance to this study, and the specific analytical methods employed.

4.1 Regression Discontinuity Design:

A regression discontinuity design is a quasi-experimental approach used when treatment is assigned based on whether an observation's running variable (here, age) crosses a specific threshold. In this design, units below the threshold remain untreated, while those above receive the treatment. The key feature of an RD design is the abrupt change in the probability of treatment at the cutoff, which can be considered random if units cannot manipulate their position around the threshold. This allows the RD design to estimate the causal effect of treatment by comparing units just above and below the cutoff, who are expected to be similar in all respects except for treatment assignment.[28]

[28] One may be concerned that Medicare itself could change when people call an ambulance. If this were to occur, then my results could be biased. I check for this possibility in Section 6.1 and find no economically meaningful

4.2 Applicability to Medicare Eligibility:

The RD design is particularly suitable for studying the impact of Medicare, as eligibility is largely determined by age. At age 65, there is a large discontinuity in the probability of having Medicare, making it an ideal threshold for analysis.[29] The use of age 65 as a cutoff to estimate Medicare's impact is well-established in the literature (e.g., Decker and Rapaport, 2002; Lichtenberg, 2002; Decker, 2005; Card et al., 2008, 2009). This is because all US citizens become eligible for Medicare at age 65, meaning there is an abrupt change in the probability of treatment (i.e., having Medicare) based on an observable score (i.e., age) with a clearly defined cutoff (i.e., age 65). Approximately 9% of individuals ages 55-64 have Medicare, whereas over 95% of individuals over the age of 65 have Medicare (SHADAC, 2024). As long as individuals are not sorted into treatment, 64-year-olds should be very similar in terms of health, education level, financial status, etc., to 66-year-olds.

4.3 EMS Provider Knowledge of Treatment Status:

In this setting, it is crucial to consider how EMS providers determine a patient's treatment status. Under EMTALA, EMS providers must respond to all 911 calls regardless of the patient's ability to pay. To ensure compliance, EMTALA prohibits dispatchers (i.e., who answers the 911 call) from asking about insurance status, but they are allowed to ask for the patient's age, which they will relay to EMS providers to give providers an indicator of potential call severity. Given the sharp increase in Medicare eligibility at age 65, EMS provider's can use a patient's age to estimate the likelihood that the patient has Medicare coverage.[30]

evidence of sorting.

[29] A "sharp" RD has a 100% treatment probability above the threshold and 0% below, while a "fuzzy" RD has a partial change in probability. In this setting, I cannot observe insurance status directly and, therefore, cannot use a fuzzy RD, which introduces some measurement error in the treatment variable. This should have an attenuating bias.

[30] This process introduces some error, as dispatchers may not obtain the exact age in certain situations, such as when the patient is unconscious. Although EMS providers may ask about insurance status after arriving on the scene, they cannot refuse to provide treatment based on this information, which they only learn after responding. EMS providers may ask about insurance status once they arrive on the scene. Discussions about insurance status post-arrival could still introduce moral hazard related to Medicare status.

4.4 Model Specification:

I leverage the age-based discontinuity in Medicare eligibility using the following model:

$$y_{it} = f(age_{it}, X_{it}) + Age65_{it}\beta + \epsilon_{it} \tag{1}$$

where y_{it} represents the treatment/transportation outcome or listed condition code for patient i in year t; age_{it} is patient age, X_{it} is a vector of controls including race, gender, urbanicity, whether or not emergency medical dispatch was performed, whether the encounter occurred on the weekend, the number of patients at the scene, the ambulance response mode, and NASEMSO region and year dummies.[31,32] $Age65_{it}$ is a binary indicator for whether patient i is age 65 or older in year t; ϵ_{it} is the error term; and $f()$ is a local-linear spline with uniform kernel weighting.[33] The coefficient β represents the Local Average Treatment Effect (LATE) of Medicare eligibility on the outcome of interest. All standard errors and estimates are robust (Calonico et al., 2014, 2019).[34]

4.5 Bandwidth and Kernel Selection:

Because I do not see the patient's birthday, the age variable in the NEMSIS is discrete, which means that estimating the MSE optimal bandwidth is not feasible. The bandwidth choice involves a tradeoff between bias and accuracy. A larger bandwidth increases the number of observations and improves estimation accuracy but introduces more bias by comparing groups further apart in age, who are more likely to differ in unobservables. Given the large sample size in NEMSIS, I prioritize reducing bias and use a bandwidth of 2.5, encompassing over 1.5 million effective observations.[35] The results are robust to different bandwidth choices (see Section 6.3).

[31] Emergency medical dispatch is when the dispatcher provides instructions to the individual who placed the 911 call, such as guiding a caller through CPR.

[32] NASEMSO regions were chosen over US census divisions as NASEMSO regions are defined based on EMS needs. For more information on NASEMSO please refer to https://nasemso.org/about/state-agencies/.

[33] The uniform kernel is used as recommended in Lee and Lemieux (2010). This modeling choice is examined in more detail in Online Appendix D.1. I fail to find evidence that the kernel choice is driving the results.

[34] The results are not clustered on the running variable, following Kolesár and Rothe (2018).

[35] Using the smallest possible bandwidth, comparing 64-year-olds to 65-year-olds, yields qualitatively similar results (as shown in Figures 1-3).

5 Results

This section presents the empirical findings on how Medicare's reimbursement rules affect ambulance services. First, I analyze the impact of the transportation requirement, which defines the ambulance benefit as a *transportation* benefit. Then, I assess the medical necessity requirement, exploring its potential role in incentivizing upcoding practices.

5.1 First Reimbursement Component: Transportation Requirement

I begin by examining how Medicare's transportation requirement impacts treatment/transportation outcomes. Before formally estimating equation (1), I visually assess the presence of a discontinuity at age 65 (i.e., Medicare eligibility) for four key treatment/transportation outcomes: (a) patient treated and transported by EMS, (b) patient refusal of care, (c) provider determination that the patient required no treatment, and (d) patient treated and released at the scene.[36] Figure 1 presents these outcomes for 911 EMS encounters, binned by patient age. The dashed line marks the age 65 threshold, with the left side representing the distance to Medicare eligibility and the right side showing the distance past it.[37]

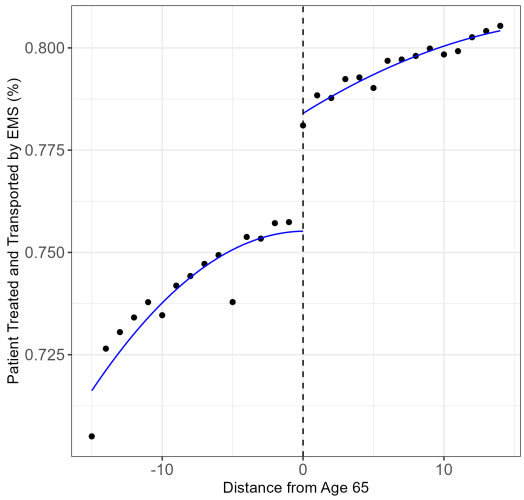
Panel (a) shows a clear discontinuity at age 65, where the probability of being treated and transported by EMS increases from approximately 77% just before age 65 to 79% just after, demonstrating the misaligned incentives of Medicare's reimbursement policies. Instead of reducing costly transports, the policy appears to incentivize them. Panel (b) reveals a corresponding drop in patient refusal of care, from 15% just before age 65 to 13% immediately after, indicating that Medicare-eligible patients are less likely to decline services. Similarly, Panel (c) shows a small decrease in cases requiring no treatment, from 2.6% to 2.4%, while Panel (d) displays no visible discontinuity in cases where patients were treated and released at the scene.

These visual patterns are corroborated by the regression discontinuity estimates, which are presented in Table 5. Panel A shows the results without controls, and Panel B shows the results with controls (outlined in Section 4.4). All results use a 2.5 bandwidth and a uniform kernel (as

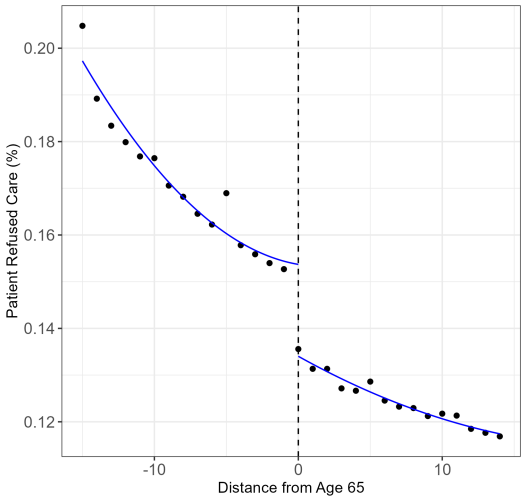
[36] Other treatment/transportation decisions – such as transport by private vehicle, law enforcement, and others– are examined in Figure B2 in Online Appendix B.1, but these account for less than 4% of encounters. While small discontinuities are present, they are not economically meaningful.

[37] Additional RD plots for other treatment/transportation choices are available in Online Appendix B.1. These four outcomes represent over 95% of patient encounters.

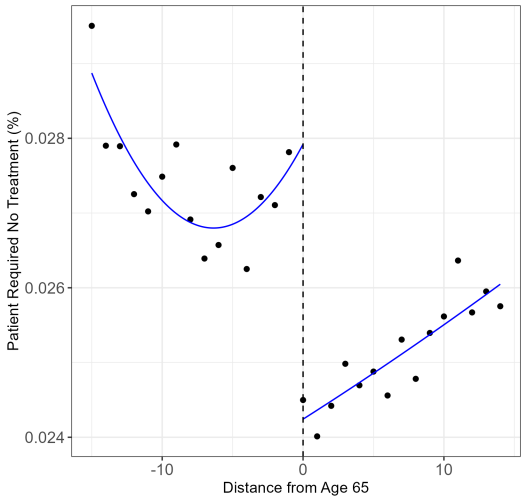
Figure 1: Regression Discontinuity Plots: EMS Treatment/Transportation Choices



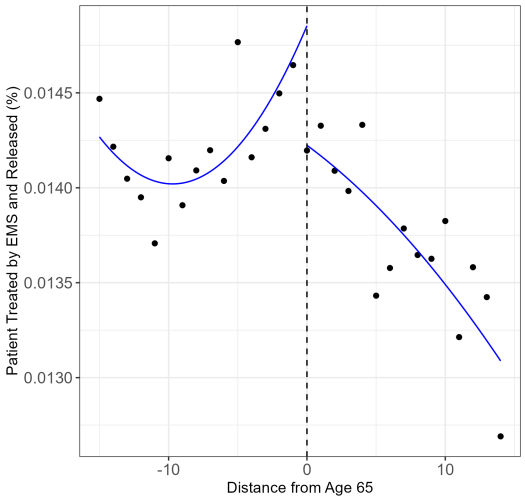
(a) Treated and Transported by EMS



(b) Patient Refused Care



(c) Patient Required No Treatment



(d) Treated by EMS and Released

Note: This figure shows treatment and transportation decisions from 911 ground ambulance EMS encounters for individuals ages 50 to 79, relative to Medicare eligibility. Panel (a) displays the likelihood of being treated and transported by EMS, panel (b) shows the probability of refusing care, panel (c) depicts the likelihood that no treatment was required, and panel (d) shows the probability of being treated and released at the scene. The dashed line represents the threshold for Medicare eligibility (age 65). The left of the line indicates distance to Medicare eligibility, and the right shows time past eligibility.

recommended in Lee and Lemieux (2010)).

Column (1) of Table 5 shows that Medicare eligibility increases the probability of being transported by EMS by 1.8 percentage points without controls and 1.7 percentage points with controls.

Table 5: Regression Discontinuity Models for EMS Treatment/Transportation Choices

Panel A: No Controls

	Treated-Transported:	Refused Care:	No Treatment:	Treated-Released:
	(1)	(2)	(3)	(4)
Over Age 65	0.018***	−0.013***	−0.003***	−0.001
	(0.003)	(0.002)	(0.001)	(0.001)
Bandwidth	2.5	2.5	2.5	2.5
Effective Observations	1,589,779	1,589,779	1,589,779	1,589,779

Panel B: Controls

	Treated-Transported:	Refused Care:	No Treatment:	Treated-Released:
	(1)	(2)	(3)	(4)
Over Age 65	0.017***	−0.013***	−0.003***	−0.001
	(0.003)	(0.002)	(0.001)	(0.001)
Bandwidth	2.5	2.5	2.5	2.5
Effective Observations	1,589,779	1,589,779	1,589,779	1,589,779

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. This table presents regression discontinuity results at age 65 for EMS treatment and transportation decisions during 911 ALS/BLS calls for individuals aged 50-79. A uniform kernel is used (as per Lee and Lemieux (2010)), with a 2.5 bandwidth. Panel A shows results without controls, while Panel B includes demographic, temporal, geographic, and operational controls (outlined in Section 4.4). All standard errors and estimates are robust (Calonico et al., 2014, 2019).

These effects are statistically significant at the 1% level and represent a 2.4% and 2.3% increase, respectively, relative to the mean transportation rate of 75% for individuals just below the age 65 threshold. Correspondingly, Columns (2) and (3) show decreases of 1.3 percentage points and 0.3 percentage points for the probability of refusing care and the probability of requiring no treatment, respectively. Both of these estimates are statistically significant at the 1% level and remain consistent when controls are added. Consistent with panel (d) of Figure 1, I fail to find a statistically significant discontinuity for whether the patient was treated and released at the scene (column (4)).

Overall, the results in Table 5 tell a consistent story: Medicare's transportation requirement creates moral hazard, resulting in increased ambulance use by Medicare patients and incentivizing EMS providers to transport Medicare patients disproportionately. Given that over 90% of patients that are transported go to the hospital (Table 4), this moral hazard induces not only more transports but specifically transports to hospitals, which are among the most costly healthcare facilities. While the financial element of these transports is significant, the increase in transports has more broad-reaching effects on the wider healthcare system. An additional transport removes an ambulance from the system, potentially increasing response times if an ambulance is unavailable

for another emergency. Additionally, patients being transported disproportionately to the hospital can exacerbate emergency department crowding, resulting in longer wait times and potentially increasing ambulance diversion.[38] Overcrowding and ambulance diversion both could result in worse patient outcomes and, if they lead to higher acuity for the patient, increased Medicare hospital spending.

5.1.1 Interpretation of Results: Moral Hazard Discussion

Moral hazard in ambulance transports can originate from both patients and providers. Figure 2 summarizes the sources of moral hazard in ambulance transports and how these lead to increased transports. From the patient's side, two potential channels lead to moral hazard. The first stems from reduced cost-sharing under Medicare, which is lower than private insurance or being uninsured. Research shows that lower out-of-pocket costs can induce moral hazard, where patients over-utilize services because they bear less of the cost (e.g., Pauly, 1968; Haviland et al., 2016; Whaley et al., 2017; Brot-Goldberg et al., 2017). Specifically, the average out-of-pocket cost for ambulance services drops from \$187 for 50-64-year-olds to \$158 for those aged 65 and above – a 15.5% price decrease (MEPS, 2012-2016).[39] This price change can explain why more patients opt for transport after turning 65, leading to the observed increase in transports and a decrease in refusals (as shown in Figure 1 and Table 5).[40] However, this channel of patient moral hazard – driven by cost-sharing – is not directly related to Medicare's reimbursement policies.

The second channel, which is directly linked to Medicare's reimbursement rules, arises because Medicare only covers ambulance services if they involve transportation. Aware of this, patients may insist on being transported to ensure that Medicare covers the encounter. This means that Medicare's transportation requirement itself may encourage unnecessary transports, as patients seek to avoid the balance billing that occurs when no transport is provided.[41]

[38] Ambulance diversion is a process by which an emergency department temporarily closes for ambulances due to overcrowding, lack of resources, or staffing issues. Under ambulance diversion, an ambulance will either be redirected to another (further away) hospital or will be required to idle outside the hospital until the hospital is no longer on ambulance diversion.

[39] This is based on Medical Expenditure Panel Survey (MEPS) data from 2012-2016; see Online Appendix C for details.

[40] Concerns about adverse selection, where sicker patients are more likely to have Medicare, are mitigated by several factors: 1. Over 95% of individuals over age 65 have Medicare (SHADAC, 2024); 2. The RD design accounts for health differences between ages 64 and 66; 3. Section 5.2 shows no discontinuity for non-reimbursable condition codes, which should also be present if sicker patients are being transported.

[41] Even if patients ultimately do not pay the balance bill, it can still negatively affect their credit, effectively creating

The distinction between these two sources of moral hazard is important. Roughly 80% of the increase in transports (or 1.92% of the total 2.4%) comes from fewer patients refusing care, indicating patient moral hazard. If this rise in transports is due to the first channel, related to cost-sharing, then Medicare's reimbursement structure does not add an *additional* financial burden, as these transports would occur regardless. However, if the second channel is responsible, then Medicare's transportation requirement is *directly* driving up Medicare's costs, and potentially contributing to inefficiencies in the healthcare system like emergency department (ED) overcrowding and delayed ambulance response times.

To quantify the effect of cost-sharing on patient behavior, I use the ambulance services price elasticity estimate from Ellis et al. (2017) (-0.07). This elasticity suggests that a 10% reduction in ambulance service costs would lead to a 0.7% increase in transports. Given the 15.5% reduction in out-of-pocket costs from Medicare-eligible individuals (compared to those aged 50-64), one would expect a 1.1% increase in transports due to cost-sharing changes, which accounts for roughly 60% of the observed decrease in care refusals. This implies that 60% of the reduction in refusals is driven by cost-sharing, while 40% results from Medicare's transportation requirement.[42]

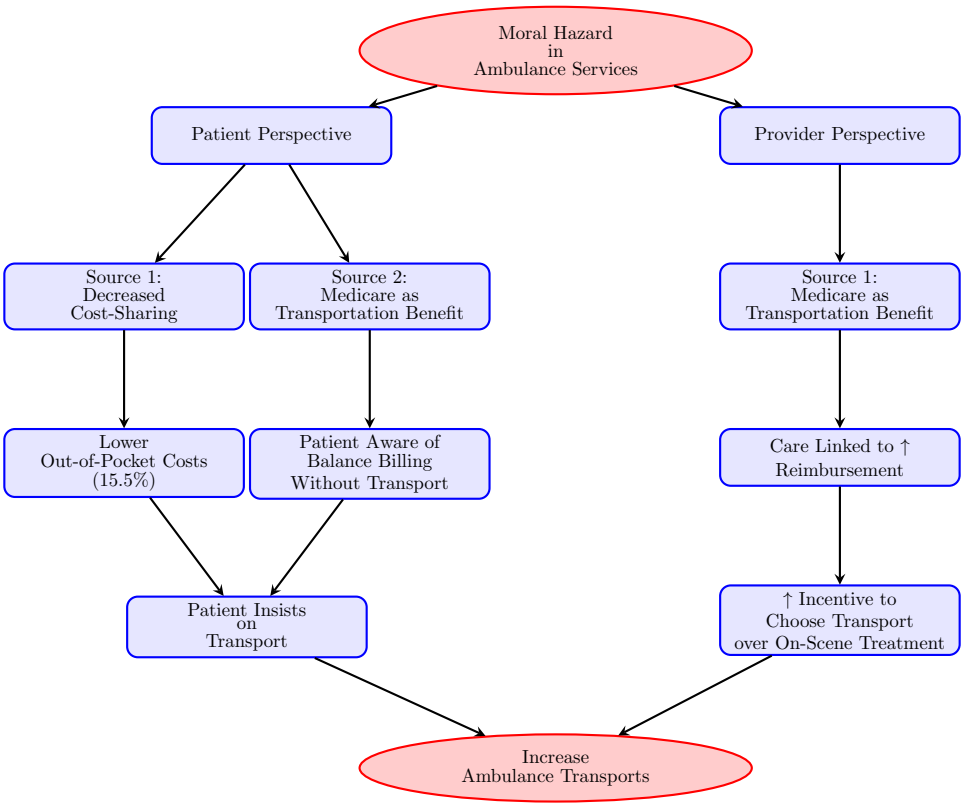
Provider behavior also plays a critical role. Under Medicare's reimbursement structure, which only pays for transporting patients, providers have financial incentives to increase the frequency and intensity of services, such as opting for transport over on-scene treatment, or choosing more distant hospitals (Zeckhauser, 1970).[43] This reimbursement policy creates an incentive for providers to transport patients, even when on-scene treatment might suffice. This accounts for around 20% of the increase in transports, as shown in Table 5. Since alone providers determine the need for patient treatment, about 20% of the observed increase in transports can be attributed to provider-induced moral hazard. In total, roughly half (46%) of the increase in ambulance transports can be directly attributed to moral hazard induced by Medicare's *reimbursement* policies. The financial implications of this transportation requirement will be explored in Section 7.

a situation where Medicare's non-transportation encounters have 100% cost-sharing, similar to being uninsured.

[42] See Online Appendix C for details supporting this 40% estimate as conservative.

[43] See Section 2 for further discussion on Medicare's transportation reimbursement rules.

Figure 2: Flowchart of Moral Hazard in Ambulance Services



Note: This flowchart illustrates the sources of moral hazard in ambulance services from both the patient and provider perspectives. The key factors leading to increased ambulance transports (i.e., moral hazard) as a result of Medicare are highlighted.

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5.2 Second Reimbursement Component: Medical "Necessity" Criteria

Next, I examine how Medicare's second requirement – medical necessity – affects the condition codes listed by EMS providers. I focus on codes that Medicare deems reimbursable (as outlined in Section 2.2) and whether they are easily verifiable at the emergency department (defined in Section 3.3). If the increase in transports were due solely to patients' underlying health (which the RD design should account for), one would expect no significant difference between the use of verifiable and non-verifiable reimbursable condition codes around the Medicare eligibility threshold. However, a disproportionate increase in the use of non-verifiable reimbursable condition codes would suggest that EMS providers are upcoding to meet Medicare's second reimbursement requirement: medical necessity. I also examine a placebo condition code – non-traumatic headache – that is not considered medically necessary. Unlike Medicare's transportation requirement, where both patient

and provider behavior can influence outcomes, condition codes are solely determined by providers, meaning any observed upcoding would directly result from providers responding to Medicare's reimbursement rules, rather than patient behavior.

I begin by visually inspecting discontinuities at age 65 for three key outcomes: (a) the use of non-verifiable reimbursable condition codes, (b) the use of verifiable reimbursable condition codes, and (c) the use of the non-reimbursable placebo code (non-traumatic headache). Figure 3 displays these outcomes for 911 EMS encounters that resulted in transport, binned by age, with the dashed line marking Medicare eligibility at age 65. The left of the dashed line shows ages leading up to Medicare eligibility, and the right shows ages after 65.

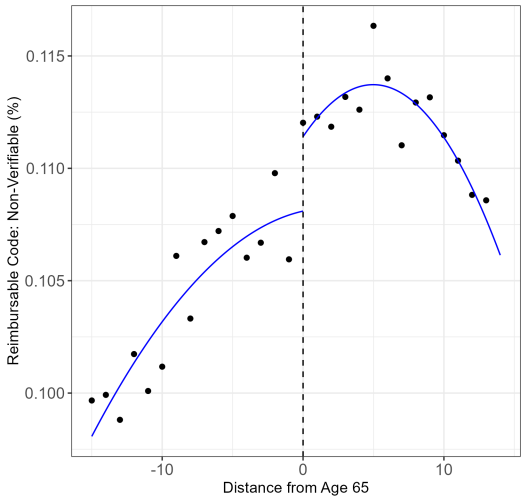
Panel (a) of Figure 3 shows a clear jump in the use of non-verifiable reimbursable codes at age 65, increasing from 10.5% just before Medicare eligibility to 11.5% immediately after. In contrast, Panel (b) shows only a marginal increase in easily verifiable condition code usage, with no clear discontinuity at the threshold. This suggests that most of the increase in transports is driven by non-verifiable condition codes. Lastly, panel (c) shows no discontinuity for the placebo code (non-traumatic headache), reinforcing the reliability of the results.

These visual patterns are confirmed by the RD estimates presented in Table 6. Panel A shows the results without controls, while Panel B includes demographic, temporal, and operational controls (as described in Section 4.4). All results use a 2.5 bandwidth and a uniform kernel (as recommended in Lee and Lemieux (2010)).

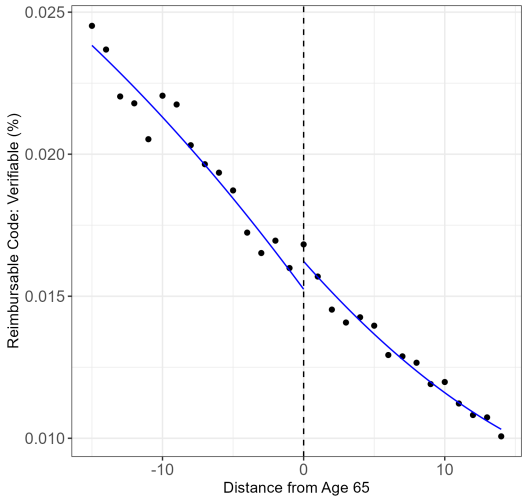
Column (1) reiterates the results from Table 5 to facilitate comparison, showing the increase in EMS transports at the Medicare eligibility threshold. Column (2) shows a statistically significant increase in the use of non-verifiable reimbursable condition codes, ranging from 0.8 to 1 percentage point depending on the inclusion of controls. This represents a 7.6% to 9.5% increase compared to the mean usage rate just below age 65. In contrast, Column (3) shows only a 0.2 percentage point increase in the use of verifiable reimbursable condition codes, which is statistically significant but small.[44] Importantly, Column (4) shows no significant change in the non-reimbursable placebo condition code, reinforcing that the observed upcoding is linked to Medicare's reimbursement rules rather than differences in patient health.

[44]Section 6.4 demonstrates that this significance is sensitive to the classification of verifiable codes, which aligns with the RD plot in Figure 3.

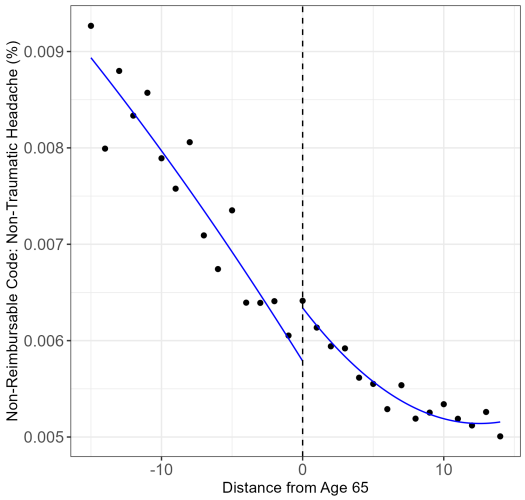
Figure 3: Regression Discontinuity Plots: Condition Code Usage



(a) Reimbursable Codes: Condition Not-Verifiable



(b) Reimbursable Codes: Condition Verifiable



(c) Non-Reimbursable Code: Non-Traumatic Headache

Note: This figure shows the distribution of Medicare-reimbursable condition codes for 911 ground ambulance EMS encounters that resulted in transport, plotted by age (50 to 79) relative to Medicare eligibility at age 65. Panel (a) depicts the use of non-verifiable reimbursable condition codes, panel (b) shows verifiable reimbursable condition codes, and panel (c) provides a placebo check with a non-reimbursable condition code: non-traumatic headache. The dashed line marks the threshold for Medicare eligibility at age 65. A full list of condition codes and their verifiability is provided in Table 3 in Section 3.3.

These results provide evidence of upcoding in response to Medicare's reimbursement policies. The larger increase in non-verifiable reimbursable codes compared to verifiable ones implies that

Table 6: Regression Discontinuity Models for Condition Code Usage

Panel A: No Controls

	Treated-Transported:	Reimbursable Codes: Condition Not-Verifiable	Reimbursable Codes: Condition Verifiable	Non-Reimbursable Code: Non-Traumatic Headache
	(1)	(2)	(3)	(4)
Over Age 65	0.018***	0.01***	0.002***	0.001
	(0.003)	(0.002)	(0.001)	(0.001)
Bandwidth	2.5	2.5	2.5	2.5
Effective Observations	1,589,779	1,227,342	1,227,342	1,227,342

Panel B: Controls

	Treated-Transported:	Reimbursable Codes: Condition Not-Verifiable	Reimbursable Codes: Condition Verifiable	Non-Reimbursable Code: Non-Traumatic Headache
	(1)	(2)	(3)	(4)
Over Age 65	0.017***	0.008***	0.002**	0.001
	(0.003)	(0.002)	(0.001)	(0.001)
Bandwidth	2.5	2.5	2.5	2.5
Effective Observations	1,589,779	1,227,342	1,227,342	1,227,342

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. This table presents the regression discontinuity results at age 65 for condition code usage during 911 ALS/BLS calls that resulted in transport for individuals aged 50-79. Column (1) shows the likelihood of patient treatment/transport by EMS, corresponding to column (1) in Table 5. Columns (2) and (3) display the results for Medicare reimbursable condition codes, categorized by whether they are easily verifiable at the emergency department (see Table 3 in Section 3.3). Column (4) shows the results for a placebo condition code (Non-Traumatic Headache, 8019), which is never reimbursable by Medicare. A uniform kernel and a 2.5 bandwidth are used (as recommended in Lee and Lemieux (2010)). Panel A reports the results without covariates, while Panel B includes demographic, temporal, geographic, and operational controls (detailed in Section 4.4). All standard errors and estimates are robust (Calonico et al., 2014, 2019).

EMS providers may strategically use harder-to-verify codes to meet Medicare's medical necessity criteria. The 1 percentage point rise in the use of non-verifiable codes accounts for roughly 56% of the overall increase in transports (1.8 percentage points), indicating that upcoding may be a significant driver of additional transports for Medicare-eligible patients. The lack of change in the placebo code further supports the conclusion that these changes in condition code usage are tied to Medicare's reimbursement rules rather than patient health differences.

5.2.1 Interpretation of Results: Upcoding Costs

The results in Table 6 show that Medicare's medical necessity requirement creates a financial incentive for providers to disproportionately use condition codes that qualify for reimbursement but are difficult to verify upon arrival at the emergency department. While this behavior imposes costs on Medicare, quantifying the financial burden is challenging because these costs stem from the inefficiencies upcoding introduces into the broader healthcare system, not directly from the transports themselves. Since upcoding occurs only when a transport takes place, the direct financial

impact of upcoding is embedded within the overall cost of increased transports driven by Medicare's transportation requirement. To fully assess the costs of Medicare's medical necessity rule, one must account for the indirect costs of upcoding, which comes from the inefficiencies it introduces within emergency departments.

Upcoding introduces inefficiencies in emergency departments by presenting patient conditions in a way that meets the medical necessity criteria but may not accurately reflect the patient's true state. This discrepancy can significantly affect the decision-making process in emergency departments, potentially leading to: (1) unnecessary and costly diagnostic tests, which Medicare ultimately covers, (2) improper triaging, potentially delaying care, worsening patient outcomes, and increasing costs for Medicare and other insurers, and (3) the misallocation of resources, as emergency departments may prioritize patients who appear more critical than they actually are.[45] The evidence from Table 6 highlights that upcoding is particularly prevalent for codes that are hard to verify, increasing the likelihood of additional testing and misallocated resources in emergency departments.

This externality on emergency departments arises directly from Medicare's *ambulance* reimbursement rule for medical necessity. While upcoding undoubtedly carries costs, quantifying these costs would require detailed hospital data linking ambulance transports to emergency department outcomes, which is beyond the scope of this paper. As a result, the financial estimates of the cost of Medicare's reimbursement rules in Section 7 should be considered a lower bound, since they account only for the direct costs of the transportation requirement and not the broader system inefficiencies caused by upcoding.

6 Validity, Robustness, and Placebo Tests

This section validates the key assumptions of the RD design and tests the robustness of the main results. First, I assess the RD design assumptions by (1) checking for sorting based on the running variable, and (2) conducting balance tests on predetermined covariates. Next, I ensure result robustness by testing the sensitivity of the main findings to (1) modeling specifications and (2)

[45] For example, non-traumatic chest pain is a reimbursable but non-verifiable condition code. Emergency department providers, concerned about the possibility of a heart attack, may run expensive tests and assign higher priority to the patient based on the ambulance provider's report.

condition code categorization. Finally, I perform placebo tests at alternative age thresholds to verify that the observed discontinuity at age 65 is unique and attributable to Medicare's reimbursement policies.

6.1 Sorting Test:

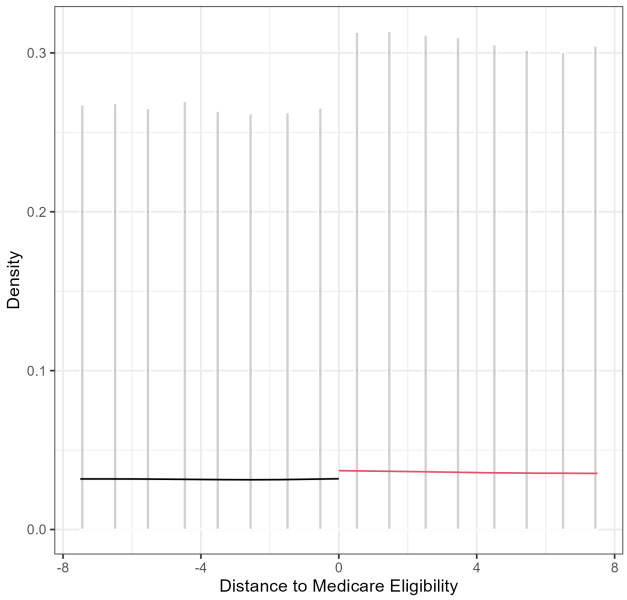
The regression discontinuity design assumes that individuals cannot manipulate the running variable to qualify for treatment or sort themselves into treatment. In this context, age is the running variable, which cannot be directly manipulated. However, there is a concern about indirect sorting: Medicare coverage might lead individuals to call 911 more frequently, reflecting patient moral hazard from source 1 rather than an effect of Medicare's reimbursement rules. To test for this potential sorting, I use the Cattaneo et al. (2020) manipulation test, which is specifically designed for discrete running variables.[46] This test checks for a discontinuity in the density of the running variable at the threshold, which would indicate sorting around the cutoff.

Figure 4 presents the results of the Cattaneo et al. (2020) manipulation test, which checks for discontinuities in the density of 911 calls around the Medicare eligibility cutoff. The x-axis indicates the distance to Medicare eligibility (age 65), and the y-axis indicates the density. A small but statistically significant ($p < 0.001$) discontinuity is detected, suggesting a slight increase in 911 calls for Medicare-eligible individuals. However, the change is minimal (approximately 0.4 percentage points), implying that while the effect is statistically significant from the large sample size, any effect of Medicare-induced moral hazard from source 1 on the likelihood of calling 911 is economically insignificant.

Although this effect is minor, it introduces an attenuating bias in my analysis, suggesting that the results in Tables 5 and 6 are likely lower bounds. If Medicare-eligible individuals are more likely to call 911 due to moral hazard, the marginal Medicare ambulance caller will be *healthier* than their non-Medicare counterpart. This would dampen the estimates, as the primary concern is that Medicare patients being *less* healthy than non-Medicare patients might drive the observed results. The minimal discontinuity observed supports the validity of the RD design and suggests

[46] The McCrary (2008) sorting test is traditionally used for testing sorting in RD designs and checks for significant discontinuities in the density of the running variable at the cutpoint. However, because this test is designed for continuous running variables, it may produce unreliable results when applied to discrete running variables. I, therefore, use the Cattaneo et al. (2020) manipulation test, which is tailored for discrete running variables.

Figure 4: Density of 911 Calls Around Medicare Eligibility Age



Note: This figure shows the estimated density of 911 calls for individuals just below and above the Medicare eligibility threshold of age 65 using the Cattaneo et al. (2020) manipulation test. The black line on the left represents the density estimate for Medicare-ineligible individuals (i.e., below age 65), while the red line on the right represents the density estimate for Medicare-eligible individuals (i.e., aged 65 and above). The grey bars indicate the histogram of calls. The kernel is uniform, and the bandwidth is 2.5 to align with the main results.

that the assumption of no sorting around the cutoff is reasonably satisfied.

6.2 Covariate Balance Tests:

Beyond the assumptions of no sorting or manipulation of the running variable (age), the validity of the RD design depends on individuals just below and above the age 65 threshold being comparable in all characteristics except Medicare eligibility. This means variation in treatment status near the cutoff can be treated as if randomly assigned. To evaluate this, I check for balance in predetermined covariates – characteristics that should not be affected by Medicare eligibility – such as demographics (race, gender) and encounter characteristics (urbanicity, region). Balance across these covariates indicates that no other systematic differences exist between individuals just below and just above the threshold, supporting the assumption of comparability and ruling out the influence of other factors on the observed treatment effect.

I test for balance by checking for discontinuities in predetermined covariates at the age 65

threshold. Table 7 reports the RD estimator, p-value, and effective number of observations for each covariate, using a bandwidth of 2.5 and a uniform kernel for consistency with Section 5. All RD estimators are statistically insignificant and small, supporting the validity of the RD design. This suggests that individuals near the threshold are similar in observable characteristics and that no other confounding factors are driving the observed treatment effect.

Table 7: Formal Continuity Based Balanced Test: Predetermined Covariates

Variable:	Bandwidth:	RD Estimator:	P-Value:	Number Observations:
Sex - Female	2.5	0.002	0.529	1,589,779
Race - Black	2.5	0.004	0.113	1,589,779
Urbanicity - Urban	2.5	0.002	0.365	1,589,779
Urbanicity - Rural	2.5	0	0.917	1,589,779
US Census Region - Island	2.5	0	0.721	1,589,779
US Census Region - Midwest	2.5	−0.002	0.409	1,589,779
US Census Region - Northeast	2.5	−0.002	0.524	1,589,779
US Census Region - South	2.5	−0.002	0.603	1,589,779

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. This table shows the results of regression discontinuity tests at age 65 for balance on predetermined covariates in 911 ALS/BLS calls for individuals aged 50-79. The bandwidth is 2.5. Columns show the bandwidth, the RD estimator, the p-value, and the effective number of observations for each covariate. All standard errors and estimates are robust (Calonico et al., 2014, 2019).

6.3 Model Specification Sensitivity:

To test the robustness of the results from Section 5, I examine the sensitivity of the RD estimates to different bandwidths. Table 8 presents the estimates using bandwidths of 2.5 (preferred), 3.5, and 4.5 years.

In Panel A, the effect of Medicare eligibility on the probability of being treated and transported remains positive and statistically significant across all bandwidths, ranging from 1.8 to 2.5 percentage points. The estimates for refusing care, being treated and released, and receiving no treatment are consistent in both direction and statistical significance across bandwidths.

Panel B shows similar patterns for condition code usage. The effect on the use of reimbursable but non-verifiable codes remains significant across bandwidths, though the magnitude slightly decreases with larger bandwidths. Reimbursable codes for verifiable conditions and the placebo condition (non-traumatic headache) show consistent effects across bandwidths as well.

These results confirm that the main findings are robust to bandwidth selection. The estimates

Table 8: Regression Discontinuity Results: Comparing Bandwidths

	2.5 BW:	Obs:	3.5 BW:	Obs:	4.5 BW:	Obs:
	Preferred Specification					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: EMS Treatment/Transportation Choices						
Treated-Transported	0.018***	1,589,779	0.02***	2,117,100	0.025***	2,646,006
Refused Care	−0.013***	1,589,779	−0.016***	2,117,100	−0.018***	2,646,006
No Treatment	−0.003***	1,589,779	−0.003***	2,117,100	−0.004***	2,646,006
Treated-Released	−0.001	1,589,779	−0.001	2,117,100	−0.001	2,646,006
	2.5 BW:	Obs:	3.5 BW:	Obs:	4.5 BW:	Obs:
	Preferred Specification					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel B: Condition Code Usage						
Reimbursable Codes: Condition Not-Verifiable	0.01***	1,227,342	0.008***	1,635,746	0.005***	2,041,317
Reimbursable Codes: Condition Verifiable	0.002***	1,227,342	0.002***	1,635,746	0.001**	2,041,317
Non-Reimbursable Code: Non-Traumatic Headache	0.001	1,227,342	0.001*	1,635,746	0	2,041,317

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. This table shows the results of the regression discontinuities at age 65 for 911 ALS/BLS calls varying the bandwidth used in estimation. Panel A presents results for EMS Treatment/Transportation Choices, while Panel B shows Condition Code Usage. Columns (1)-(2) use a bandwidth of 2.5 years, columns (3)-(4) use 3.5 years, and columns (5)-(6) use 4.5 years. Even columns provide the RD estimates, and odd columns provide the corresponding effective number of observations. Column (1) corresponds to the estimates in Column (1) of Panel A in Table 5 (i.e., treatment/transport), and Table 6 (i.e., condition code usage). The kernel is uniform (as recommended in Lee and Lemieux (2010)). All standard errors and estimates are robust (Calonico et al., 2014, 2019).

remain consistent in direction, significance, and magnitude, supporting the validity of the conclusions in Section 5. I use the 2.5-year bandwidth as the preferred specification because it provides conservative estimates and ensures that individuals just below and just above the cutoff are more comparable, enhancing the internal validity of the RD design.[47]

I also tested the sensitivity of the results to different kernel functions (uniform, triangular, and Epanechnikov) in Online Appendix D.1. Since I use a small bandwidth and discrete age data, the choice of kernel does not meaningfully affect the results. All kernel choices produce identical estimates.

6.4 Condition Code Classification Sensitivity Analysis:

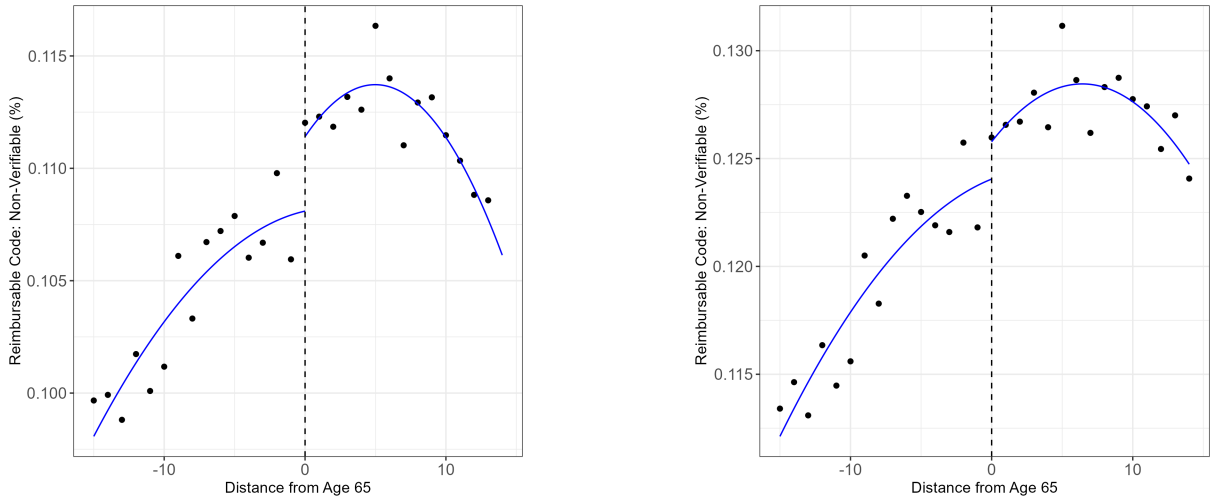
To address concerns about potential subjectivity in determining which condition codes are likely reimbursable by Medicare and easily verifiable at the hospital, I conduct a sensitivity analysis using an AI-based classification system. I employed Claude, an AI system developed by Anthropic, to independently classify NEMSIS condition codes based on the NEMSIS data manual and Medicare's

[47] A 2.5-year bandwidth is the smallest possible given the discrete age variable in NEMSIS.

guidelines for reimbursable conditions (as outlined in Table 1).[48] This approach mirrors the increasing use of AI in healthcare fraud detection (Mantas et al., 2022; Travaille et al., 2011; Zanke, 2023).

Figures 5 and 6 visually compare the regression discontinuity results using the preferred condition code classifications ((a) panels) and the AI-based classifications ((b) panels) for non-verifiable and verifiable codes, respectively. The preferred classification identified 6 non-verifiable reimbursable codes and 5 verifiable ones, while the AI method identified 11 non-verifiable and 20 verifiable codes.

Figure 5: Regression Discontinuity Plots: Non-Verifiable Condition Codes - Preferred Specification vs. AI Chosen



(a) Preferred Specification

(b) AI Determined

Note: This figure shows the proportion of 911 ground ambulance encounters with condition codes that are likely Medicare-reimbursable but non-verifiable at the emergency department, for individuals aged 50 to 79. The dashed line represents the Medicare eligibility threshold at age 65. Panel (a) displays the researcher's preferred condition code classifications (see Section 3.3), while Panel (b) shows condition codes categorized by Claude, an AI system developed by Anthropic (see Appendix A).

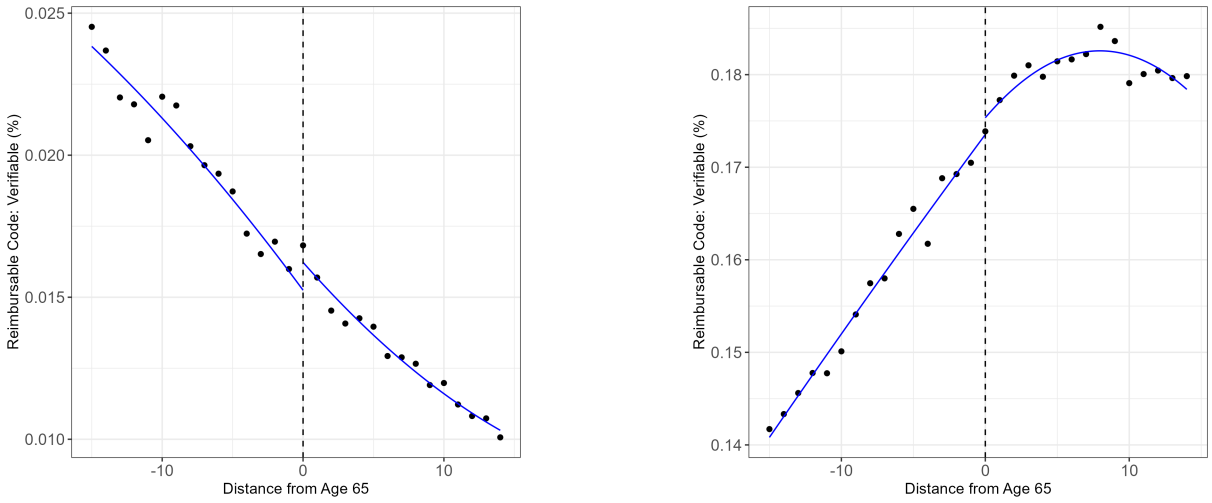
For non-verifiable reimbursable codes (Figure 5), both classification methods show a clear discontinuity at age 65, with nearly identical patterns despite differences in y-axes. The AI-based classification reveals that approximately 12% of encounters involved non-verifiable reimbursable codes, aligning closely with the preferred classification.[49] This consistency strengthens the robust-

[48] The full prompt given to AI and resulting condition code categorization are provided in Appendix A.

[49] The full summary statistics for the AI classification of condition codes can be found in Online Appendix A.

ness of the findings in Section 5.2.

Figure 6: Regression Discontinuity Plots: Verifiable Condition Codes - Preferred Specification vs. AI Chosen



(a) Preferred Specification

(b) AI Determined

Note: This figure shows the proportion of 911 ground ambulance encounters with condition codes that are likely Medicare-reimbursable and verifiable at the emergency department, for individuals aged 50 to 79. The dashed line represents the Medicare eligibility threshold at age 65. Panel (a) displays the researcher's preferred condition code classifications (see Section 3.3), while Panel (b) shows condition codes categorized by Claude, an AI system developed by Anthropic (see Appendix A).

In contrast, for verifiable reimbursable codes (Figure 6), the AI method classified a higher average usage (17%) compared to the preferred classification (2%), with usage increasing with age. Despite this difference in classification, both methods show no visual discontinuity at age 65, underscoring that the observed effects are not due to subjective code classification but reflect robust data patterns. This consistency supports the findings regarding the impact of Medicare's medical necessity requirement on condition code usage in ambulance services, demonstrating that the results hold across classification approaches and align with current practices in healthcare fraud detection.

6.5 Placebo Check:

To ensure the observed discontinuities at age 65 are due to Medicare eligibility rather than underlying non-linearities, I conduct placebo tests at ages 55 and 75. These ages are equidistant

from 65, and both end in '5', potentially capturing any systematic age or reporting-related effects. If something other than Medicare eligibility were driving the results, discontinuities should also appear at age 75, as most individuals aged 72 to 77 are Medicare-covered.

Figures 7, 8, 9, and 10 present the RD plots at the Medicare threshold (age 65) and placebo thresholds (ages 55 and 75) for whether the patient was treated and transported by EMS, refused care, required treatment, and the use of reimbursable but non-verifiable condition codes, respectively. Each figure contains four panels: (a) the full age distribution (50-79) with true and placebo thresholds, (b) ages 60-70, (c) ages 50-60 with a placebo threshold at 55, and (d) ages 70-79 with a placebo threshold at 75. Panels (b)-(d) are standardized for easier comparison.[50]

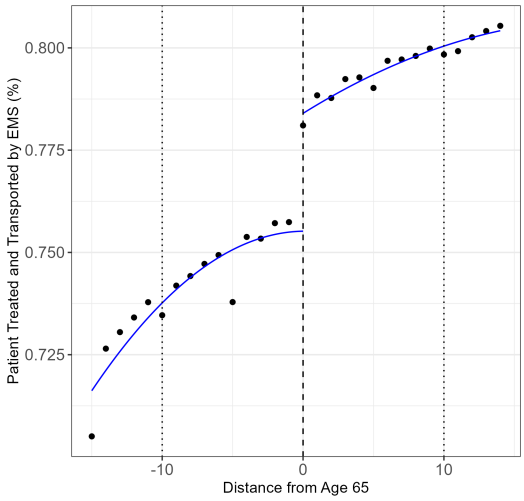
Figure 7 shows a clear discontinuity at age 65 in the probability of being treated and transported by EMS. No such discontinuities appear at ages 55 or 75, reinforcing the causal impact of Medicare eligibility. Similarly, Figure 8 shows a distinct drop in care refusal at 65, while ages 55 and 75 exhibit smooth transitions.

Figure 9 also shows a sharp decline in cases requiring no treatment at age 65, with no comparable changes at 55 or 75. Finally, Figure 10 shows an increase in the use of non-verifiable reimbursable codes at age 65, with no such changes at the placebo thresholds.

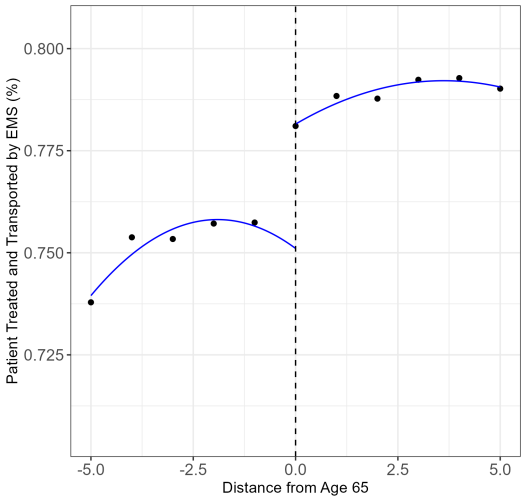
Similar patterns were observed for the other outcomes, including patients requiring no treatment, the use of verifiable reimbursable codes, and the use of a never reimbursable code: non-traumatic headache. These additional figures are presented in Online Appendix D.3. The lack of discontinuities at alternative thresholds and the sharp effects at age 65 suggest the findings are driven by Medicare eligibility and not other factors.

[50] Figures with individually optimized y-axes for clearer visualization can be found in Online Appendix D.4.

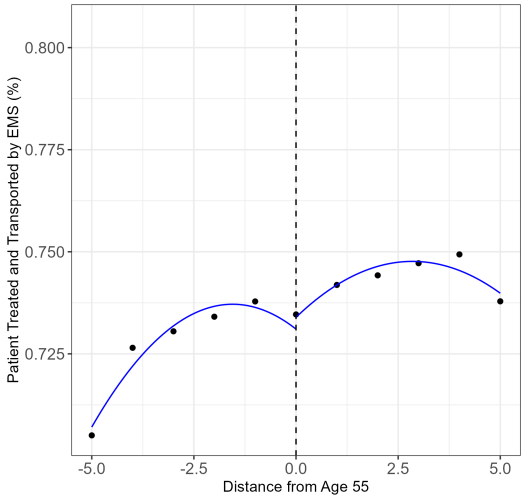
Figure 7: Regression Discontinuity Plots: Treated and Transported by EMS



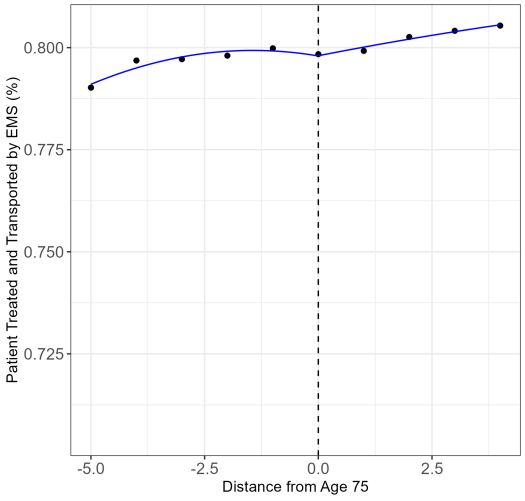
(a) Ages 50 to 79: Threshold Age 65



(b) Ages 60 to 70: Threshold Age 65



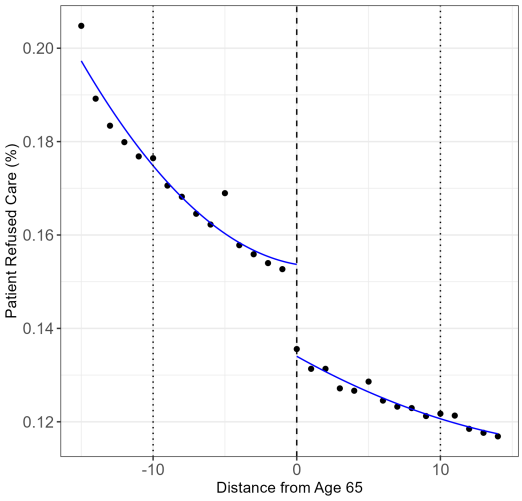
(c) Ages 50 to 60: Threshold Age 55



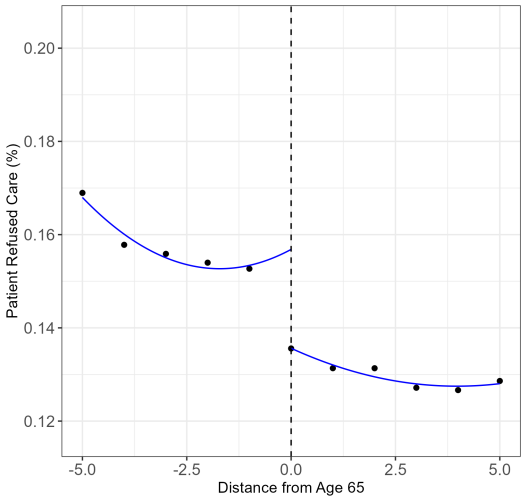
(d) Ages 70 to 79: Threshold Age 75

Note: This figure displays regression discontinuity plots for whether a 911 ground ambulance encounter resulted in the patient being treated and transported by EMS. Panel (a) shows the full age range (50-79) with the discontinuity at age 65 (Medicare eligibility). Dotted lines mark ages 55 (-10) and 75 (+10), used as placebo checks. Panel (b) focuses on ages 60-70 with the discontinuity at age 65. Panels (c) and (d) show placebo checks: Panel (c) for ages 50-60 with the discontinuity at age 55, and Panel (d) for ages 70-79 with the discontinuity at age 75. The dashed line represents zero distance from the threshold.

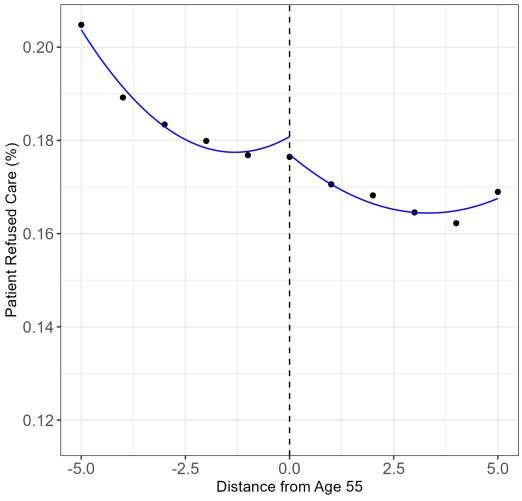
Figure 8: Regression Discontinuity Plots: Patient Refused Care



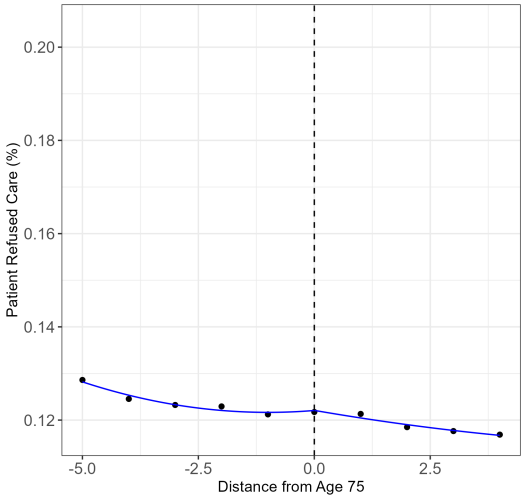
(a) Ages 50 to 79: Threshold Age 65



(b) Ages 60 to 70: Threshold Age 65



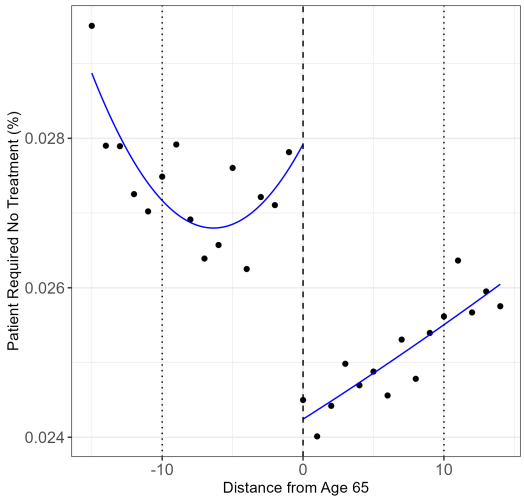
(c) Ages 50 to 60: Threshold Age 55



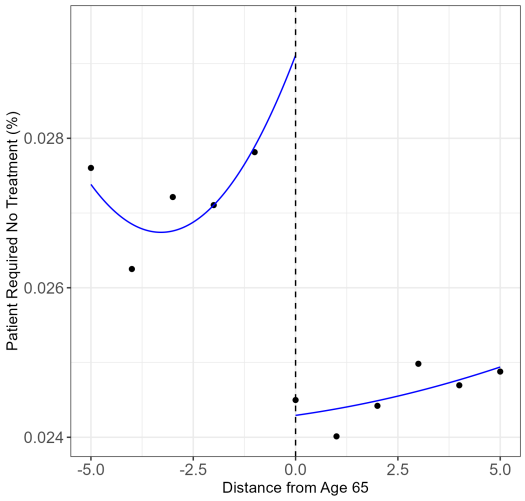
(d) Ages 70 to 79: Threshold Age 75

Note: This figure displays regression discontinuity plots for whether a 911 ground ambulance encounter resulted in the patient refusing care. Panel (a) shows the full age range (50-79) with the discontinuity at age 65 (Medicare eligibility). Dotted lines mark ages 55 (-10) and 75 (+10), used as placebo checks. Panel (b) focuses on ages 60-70 with the discontinuity at age 65. Panels (c) and (d) show placebo checks: Panel (c) for ages 50-60 with the discontinuity at age 55, and Panel (d) for ages 70-79 with the discontinuity at age 75. The dashed line represents zero distance from the threshold.

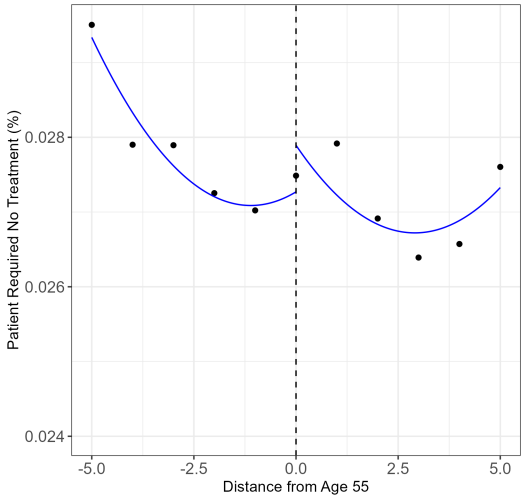
Figure 9: Regression Discontinuity Plots: Patient Required No Treatment



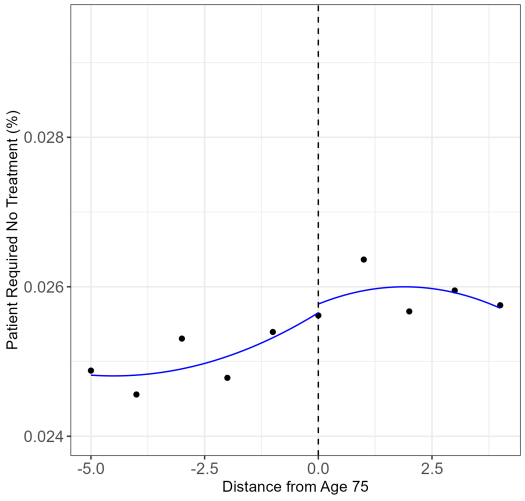
(a) Ages 50 to 79: Threshold Age 65



(b) Ages 60 to 70: Threshold Age 65



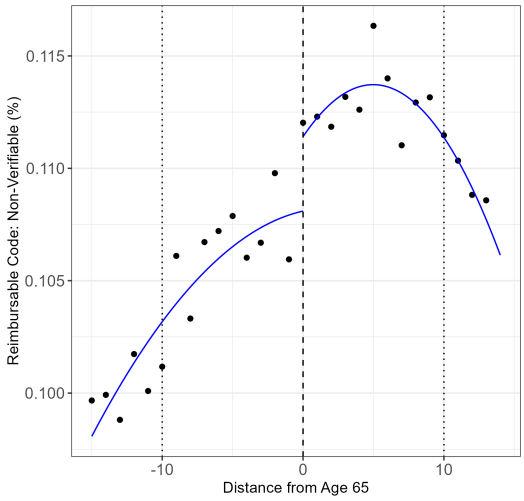
(c) Ages 50 to 60: Threshold Age 55



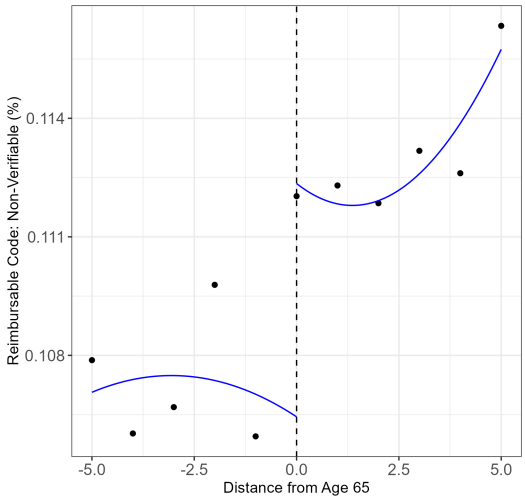
(d) Ages 70 to 79: Threshold Age 75

Note: This figure displays regression discontinuity plots for whether a 911 ground ambulance encounter resulted in the patient did not require treatment by EMS. Panel (a) shows the full age range (50-79) with the discontinuity at age 65 (Medicare eligibility). Dotted lines mark ages 55 (-10) and 75 (+10), used as placebo checks. Panel (b) focuses on ages 60-70 with the discontinuity at age 65. Panels (c) and (d) show placebo checks: Panel (c) for ages 50-60 with the discontinuity at age 55, and Panel (d) for ages 70-79 with the discontinuity at age 75. The dashed line represents zero distance from the threshold.

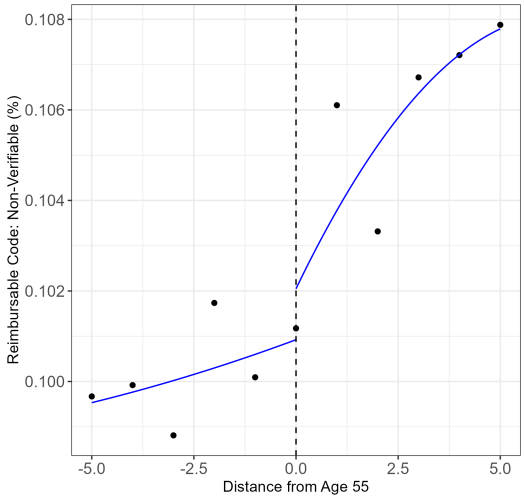
Figure 10: Regression Discontinuity Plots: Non-Verifiable Reimbursable Codes



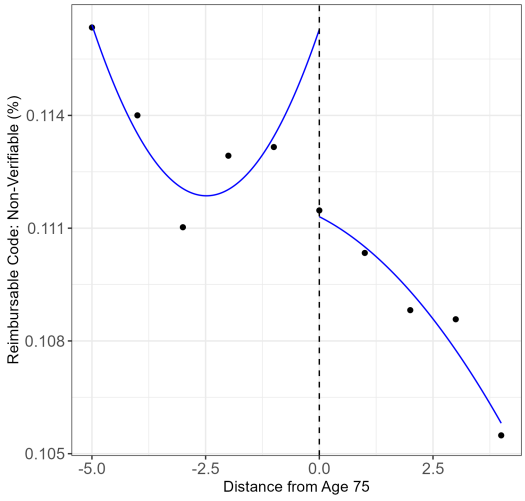
(a) Ages 50 to 79: Threshold Age 65



(b) Ages 60 to 70: Threshold Age 65



(c) Ages 50 to 60: Threshold Age 55



(d) Ages 70 to 79: Threshold Age 75

Note: This figure displays regression discontinuity plots for whether a patient treated and transported by EMS during a 911 ground encounter had a condition code that was reimbursable but non-verifiable at the emergency department. Panel (a) shows the full age range (50-79) with the discontinuity at age 65 (Medicare eligibility). Dotted lines mark ages 55 (-10) and 75 (+10), used as placebo checks. Panel (b) focuses on ages 60-70 with the discontinuity at age 65. Panels (c) and (d) show placebo checks: Panel (c) for ages 50-60 with the discontinuity at age 55, and Panel (d) for ages 70-79 with the discontinuity at age 75. The dashed line represents zero distance from the threshold.

7 Economic Significance

7.1 Quantitative Impact of Transportation Requirement:

To quantify the economic impact of the incentive misalignment caused by Medicare's transportation requirement, I conduct a back-of-the-envelope calculation based on the regression discontinuity estimates from Section 5.1. Table 9 presents these estimates, illustrating the increased expenditures resulting from the moral hazard induced by this policy.

Table 9 outlines three scenarios to estimate the financial burden on Medicare from its transportation requirement. Scenario 1, in Panel A, assumes 100% of the increase in transports at age 65 is due to the transportation requirement. This scenario uses the RD result for treated/transported by EMS in Section 5.1. Scenario 2, in Panel B, attributes 50% of the increase in transports to the transportation requirement, based on the analysis in Section 5.1.1, which found that half of the increase in transports stems from Medicare's transportation policy. This includes both provider-driven moral hazard (i.e., the decrease in patients not requiring treatment) and patient-driven moral hazard (i.e., fewer refusals of care), adjusted to exclude the impact of reduced cost-sharing. Scenario 3, in Panel C, assumes that 20% of the increase in transports is due to the transportation requirement, focusing solely on provider-driven moral hazard.

For each scenario, I calculate (1) the total number of extra transports (Column 1), (2) the percentage of extra transports relative to all Medicare-eligible interactions (Column 2), (3) the increased expenditure for Medicare, considering only the average ambulance costs (Column 3), and (4) increased expenditures including both the average ambulance and emergency department (ED) visit costs (Column 4).[51]

In the most expansive scenario (Panel A), assuming the full increase in transports is due to moral hazard from the transportation requirement, Medicare incurred approximately 73,000 additional transports per year between 2012 and 2016, roughly 2% of total annual Medicare-eligible interactions. This led to an annual cost of $78 to $160 million, depending on the year and whether ED costs were included. Over five years, this resulted in 365,000 additional transports, costing Medicare between $465 million (ambulance costs only) and $706 million (including ED costs).

[51] The average ambulance transport cost used is $1,275, which is the inflation-adjusted cost estimate in Birmingham et al. (2021). The average ED cost is $660, which comes from McDermott and Weiss (2019).

Table 9: Back Of The Envelope Calculations

Panel A: 100% Moral Hazard from Reimbursement Rules

Year:	Additional Transports: Total	Additional Transports: % Total Medicare-Eligible Interactions	Increase Expenditure: Ambulance Costs Only	Increase Expenditure: Ambulance and ED Costs
	(1)	(2)	(3)	(4)
2012	60,862	2.09	$77,599,119	$117,768,075
2013	71,395	2.08	$91,028,777	$138,149,556
2014	75,511	2.10	$96,276,600	$146,113,899
2015	82,429	2.11	$105,096,386	$159,499,221
2016	75,030	2.14	$95,662,936	$145,182,573
All Years	365,188	2.10	$465,614,266	$706,638,122

Panel B: 50% Moral Hazard from Reimbursement Rules

Year:	Additional Transports: Total	Additional Transports: % Total Medicare-Eligible Interactions	Increase Expenditure: Ambulance Costs Only	Increase Expenditure: Ambulance and ED Costs
	(1)	(2)	(3)	(4)
2012	30,431	1.05	$38,799,560	$58,884,038
2013	35,698	1.04	$45,514,389	$69,074,778
2014	37,756	1.05	$48,138,300	$73,056,949
2015	41,214	1.06	$52,548,193	$79,749,610
2016	37,515	1.07	$47,831,468	$72,591,286
All Years	182,594	1.05	$232,807,133	$353,319,061

Panel C: 20% Moral Hazard from Reimbursement Rules

Year:	Additional Transports: Total	Additional Transports: % Total Medicare-Eligible Interactions	Increase Expenditure: Ambulance Costs Only	Increase Expenditure: Ambulance and ED Costs
	(1)	(2)	(3)	(4)
2012	12,172	0.42	$15,519,824	$23,553,615
2013	14,279	0.42	$18,205,755	$27,629,911
2014	15,102	0.42	$19,255,320	$29,222,780
2015	16,486	0.42	$21,019,277	$31,899,844
2016	15,006	0.43	$19,132,587	$29,036,515
All Years	73,038	0.42	$93,122,853	$141,327,624

Note: This table provides back-of-the-envelope estimates of the impact of Medicare's transportation requirement on ambulance use. Column (1) shows the estimated additional transports, column (2) presents this as a percentage of Medicare-eligible interactions, column (3) estimates the increased cost for ambulance transports, and column (4) includes both ambulance and emergency department (ED) costs. Panel A assumes that 100% of the increase in transports at age 65 is due to Medicare's reimbursement rules, based on estimates from Table 5. Panel B assumes that 50% of the increase is due to Medicare's rules (calculated in Section 5.1.1), accounting for both provider-driven moral hazard and patient-driven moral hazard, excluding the portion due to reduced cost-sharing. Panel C assumes that 20% of the increase is attributable to Medicare's rules, representing only the provider-driven moral hazard. The expenditure estimate in column (3) uses an average ambulance reimbursement of $1,275 (inflation-adjusted from Birmingham et al. (2021)). Column (4) adds an average Medicare ED payment of $660 (from McDermott and Weiss (2019)) to the ambulance cost. These estimates represent a lower bound, as the NEMSIS data excludes interactions from states that do not submit data, and they do not account for costs related to upcoding or broader inefficiencies in the healthcare system due to Medicare's reimbursement structure.

A more moderate estimate (Panel B) attributes 50% of the increase in transports to Medicare's transportation requirement. This scenario estimates an average of 36,500 additional transports per year (roughly 1.1% of total interactions), increasing Medicare's annual costs by $38 to $80 million. Over five years, this led to 182,500 extra transports, costing Medicare between $232 and $353 million. In the most conservative scenario (Panel C), where only provider-driven moral hazard is considered, the policy caused an estimated 73,000 transports over five years, costing Medicare

between $93 and $141 million.

7.2 Policy Implications:

Even the most conservative estimate underscores the significant financial burden that Medicare's ambulance benefit, structured as a transportation benefit, imposes on the program. This is especially concerning given ongoing concerns about Medicare's financial sustainability (Social Security Administration, 2024). However, these estimates are likely a lower bound for several reasons. First, the NEMSIS data from 2012 to 2016 does not encompass all Medicare interactions nationwide, as not all states submitted their data.

Second, overtransport has likely worsened due to shifts in private insurance policies. In recent years, more private insurers have begun reimbursing ambulance providers for non-transport encounters (National Association of Emergency Medical Technicians, 2017). This change has widened the gap between Medicare and private payers, further increasing the incentives for EMS providers to transport Medicare patients.

Additionally, these estimates do not account for potential downstream costs to Medicare, such as increased patient acuity due to delayed ambulance response times, which could lead to more intensive and costly care in both the ambulance and the hospital. Lastly, these estimates only reflect the costs related to Medicare's transportation requirement. As discussed in Section 5.2.1, Medicare's medical necessity criteria also generates significant costs. Upcoding to meet this requirement creates externalities for emergency departments, such as (1) unnecessary and costly diagnostic tests, and (2) improper triaging, potentially delaying care, worsening patient outcomes, and further increasing costs for Medicare and other insurers. Due to data limitations, these costs are not included in the back-of-the-envelope calculation.

There are several policy options available to Medicare to mitigate the unintended consequences of its reimbursement structure. To address the financial burden of the transportation requirement, Medicare could allow EMS providers to transport patients to lower-acuity facilities, such as urgent care centers, reducing the frequency of costly emergency department visits (Alpert et al., 2013). While this could maintain high transport rates, it could help lower overall costs. However, implementing this would require significant changes to EMS protocols and training, costs that would primarily fall on ambulance providers. Another option is to modify the reimbursement

structure to allow for payments for non-transport encounters, thereby eliminating the incentive to over-transport. However, this could result in under-transporting Medicare patients, given that Medicare's reimbursement rates are lower than those of private insurers, which could negatively impact patient health.

To address the effects of the medical necessity requirement, Medicare could introduce stricter auditing of ambulance services. This could help reduce upcoding but would increase monitoring costs and might lead to undertreatment if providers become overly cautious. Additionally, this could lead to financial challenges for providers, as increased monitoring raises transaction costs. A combination of approaches may be required to address the full scope of these unintended consequences. Further research on the long-term health and financial effects of different policy combinations would be valuable.

8 Conclusions

This paper reveals unintended consequences of Medicare's two key reimbursement policies for ambulance services – the transportation requirement and medical necessity criterion – which lead to increased ambulance transports and upcoding. By leveraging the age 65 Medicare eligibility cutoff, I demonstrate that Medicare's transportation requirement induces moral hazard from both patients and providers, contributing to a significant rise in ambulance transports. After accounting for patient behavior driven by reduced cost-sharing, I find that the transportation requirement itself is responsible for roughly half of the observed increase in transports, paradoxically inflating costs instead of controlling them.

Additionally, Medicare's medical necessity requirement encourages providers to upcode conditions that are reimbursable but difficult to verify at the hospital, further misaligning incentives. Robustness checks confirm that both the increased transportation and upcoding findings are driven by Medicare's policies rather than other factors.

The financial impact of this misalignment is substantial. A conservative estimate suggests that the transportation requirement alone cost Medicare approximately $350 million over five years. Importantly, this is likely a lower bound. Recent shifts in private insurance policies, with more insurers now reimbursing non-transport ambulance encounters, have widened the gap between

Medicare and other payers, further intensifying incentives for EMS providers to transport Medicare patients (National Association of Emergency Medical Technicians, 2017). Beyond these direct costs, upcoding leads to inefficiencies in emergency departments, resulting in unnecessary diagnostic tests, improper triaging, and misallocation of resources – all of which further strain the healthcare system and drive up costs.

These findings highlight the need for policymakers to reevaluate Medicare's ambulance reimbursement policies. While maintaining access to emergency care is essential, the current structure inadvertently promotes overuse and inefficiency, exacerbating Medicare's financial challenges and potentially impacting patient care. Future research should explore the broader implications of these misaligned incentives on the healthcare system, including their effects on emergency department operations and ambulance response times.Addressing this policy misalignment is crucial for ensuring the sustainability of Medicare, optimizing patient care, and improving the overall efficiency of healthcare delivery.

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Appendix A Condition Code Reimbursable and Verifiable Designation: Sensitivity Check

To get AI to categorize condition codes, I used Claude, which is an AI run by Anthropic. Health insurers are increasingly utilizing AI to determine fraud/upcoding (e.g., Mantas et al., 2022; Travaille et al., 2011; Zanke, 2023; Business Insider, 2023; Insurance Business, 2023). First uploaded the NEMSIS section of the data manual that included all possible condition codes and their descriptions. I then described what I wanted Claude to do and described the categories Medicare lists as likely reimbursable (as outlined in Table 1 and shown in Online Appendix E). Here is the full prompt that I utilized:

> I am working on a research project that requires me to analyze condition codes of patients involved in an EMS encounter. However, I am not in the medical profession so I am looking for assistance in determining the proper labeling of condition codes. Specifically, I would like to flag condition codes that make transportation to a hospital by ambulance likely reimbursable by Medicare. CMS provides guidance on what will be reimbursable. It specifically lists (1) Transported in an emergency situation (i.e., result of accident, injury or acute illness); (2) Needed to be restrained to prevent injury to the beneficiary or others; (3) Was unconscious or in shock; (4) Required oxygen or other emergency treatment during transport to the nearest facility; (5) Exhibits signs and symptoms of acute respiratory distress or cardiac distress such as shortness of breath or chest pain; (6) Exhibits signs and symptoms that indicated the possibility of acute stroke; (7) had to remain immobile because of a fracture that had not been set or the possibility of a fracture; (8) Is experiencing severe hemorrhage; (9) could be moved only by stretcher; and (10) was bed-confined before and after the ambulance trip. I have uploaded a pdf that lists all of the possible condition codes. Can you go through this list and tell me explicitly which condition codes meet these 10 possible for being reimbursable? When you list the condition codes, please be specific about which reimbursable category they fall under. Not all condition codes will fall under reimbursable categories. Then go through and determine which condition codes that you've selected are easily verifiable when the patient arrives at the emergency department versus not. Be specific about why you made the categorization.

The table below summarizes the categorization that Claude determined based on that prompt. For the full response, please refer to Online Appendix E.2.

Table A1: Condition Codes Categorized by Medicare Reasons and Verifiability: AI Categorized

Code	Description	Verifiability
1. Transported in an emergency situation		
8043	Major Trauma (ALS-959.8)	Verifiable
8044	Other Trauma (need for monitor or airway) (ALS-518.5)	Verifiable
8045	Other Trauma (major bleeding) (ALS-958.2)	Verifiable
8049	Other Trauma (amputation other) (ALS-887.4)	Verifiable
8050	Other Trauma (suspected internal injuries) (ALS-869.0)	Verifiable
8051	Burns-Major (ALS-949.3)	Verifiable
8055	Lightning (ALS-994.0)	Non-Verifiable
8056	Electrocution (ALS-994.8)	Non-Verifiable
8057	Near Drowning (ALS-994.1)	Non-Verifiable
8047	Other Trauma (penetrating extremity) (BLS-880.0)	Verifiable
2. Needed to be restrained to prevent injury		
8068	Patient Safety (restraints required) (BLS-298.9)	Verifiable
8064	Chemical Restraint (ALS-293.0)	Non-Verifiable
3. Was unconscious or in shock		
8042	Unconscious/Syncope/Dizziness (ALS-780.02)	Non-Verifiable
4. Required oxygen or other emergency treatment during transport		
8009	Respiratory Arrest (ALS-799.1)	Verifiable
8010	Difficulty Breathing (ALS-786.05)	Verifiable
8011	Cardiac Arrest-Resuscitation in Progress (ALS-427.5)	Verifiable
8062	Advanced Airway Management (ALS-518.81)	Verifiable
8063	IV Meds Required (ALS-No ICD code provided)	Verifiable
8065	Suctioning/Oxygen/IV fluids required (BLS-496.0)	Verifiable
8066	Airway Control/Positioning Required (BLS-786.09)	Verifiable
5. Exhibits signs and symptoms of acute respiratory or cardiac distress		
8003	Abnormal Cardiac Rhythm/Cardiac Dysrhythmia (ALS-427.9)	Non-Verifiable
8012	Chest Pain (non-traumatic) (ALS-786.50)	Non-Verifiable
8020	Cardiac Symptoms other than Chest Pain (palpitations) (ALS-785.1)	Non-Verifiable
8021	Cardiac Symptoms other than Chest Pain (atypical pain) (ALS-536.2)	Non-Verifiable
8061	Cardiac/Hemodynamic Monitoring Required (ALS-428.9)	Verifiable
6. Exhibits signs and symptoms that indicated the possibility of acute stroke		
8029	Neurologic Distress (ALS-436.0)	Non-Verifiable
7. Had to remain immobile because of a fracture or possible fracture		
8046	Other Trauma (fracture/dislocation) (BLS-829.0)	Non-Verifiable
8. Is experiencing severe hemorrhage		
8024	Hemorrhage (ALS-459.0)	Verifiable
9. Could be moved only by stretcher		
8071	Patient Safety (risk of falling off stretcher) (BLS-781.3)	Verifiable
8073	Special Handling (orthopedic device required) (BLS-907.2)	Verifiable
8074	Special Handling (positioning required) (BLS-719.45)	Verifiable
10. Was bed-confined before and after the ambulance trip		
NA	No condition codes identified	NA

Online Appendix A Summary Statistics:

Table A1: Summary Statistics: 911 Ambulance Encounters

Variable	Full Sample:		Medicare Ineligible:		Medicare Eligible:	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Dependent Variables: EMS Encounters						
Treated-Transported by EMS (%)	77.02	42.07	74.11	43.81	79.55	40.33
Patient Refused Care (%)	14.61	35.32	17.07	37.62	12.46	33.03
Treated EMS-Released (%)	1.39	11.73	1.42	11.84	1.37	11.63
No Treatment Required (%)	2.62	15.96	2.74	16.32	2.51	15.65
Treated EMS-Transported by Law Enforcement (%)	0.021	1.44	0.024	1.55	0.018	1.34
Treated EMS-Transported by Individual (%)	0.024	1.56	0.025	1.57	0.024	1.56
Treated EMS-Transferred Care (%)	0.71	8.37	0.68	8.25	0.73	8.48
No Patient Found (%)	0.36	5.96	0.40	6.31	0.32	5.65
Patient Dead At Scene (%)	2.63	16.00	2.83	16.59	2.45	15.47
Cancelled En-Route (%)	0.63	7.89	0.70	8.35	0.56	7.46
Other Variables:						
Age	65.04	8.57	57.10	4.28	71.95	4.34
Destination - Hospital (%)	70.84	45.45	68.82	46.32	72.60	44.60
Advanced Life Support (%)	66.69	47.13	66.10	47.34	67.20	46.95
Payer - Medicare (%)	43.62	49.59	27.82	44.81	57.37	49.45
Payer - Private Insurance (%)	26.40	44.08	33.26	47.11	20.42	40.31
Payer - Medicaid (%)	0.39	6.22	0.63	7.91	0.18	4.20
Payer - Self Pay (%)	10.87	31.12	16.85	37.43	5.66	23.11
Payer - Not Billed (%)	1.94	13.78	2.16	14.53	1.75	13.10
Payer - Other (%)	0.04	2.00	0.054	2.32	0.028	1.67
Payer - Unknown (%)	16.75	37.34	19.23	39.41	14.59	35.30
Race - White (%)	60.81	48.82	57.05	49.50	64.07	47.98
Gender - Male (%)	47.88	49.96	51.21	49.99	44.99	49.75
Urban Area (%)	75.39	43.07	76.83	42.19	74.14	43.79
Rural Area (%)	9.86	29.81	9.29	29.03	10.36	30.47
Region - East (%)	43.91	49.63	44.80	49.73	43.13	49.53
Region - North Central (%)	16.69	37.29	15.99	36.65	17.31	37.83
Region - South Central (%)	30.98	46.24	30.31	45.96	31.57	46.48
Region - West (%)	8.41	27.76	8.91	28.48	7.99	27.11
N	7,793,789		3,627,248		4,166,541	

Note: This table shows the summary statistics for the 2012 to 2016 NEMSIS data of 911 calls for ground CMS ambulance encounters for patients ages 50 to 79 where the payer is known if treatment is provided. This table is separated by encounters based on Medicare eligibility.

Table A2: Summary Statistics: EMS Transported 911 Ambulance Encounters

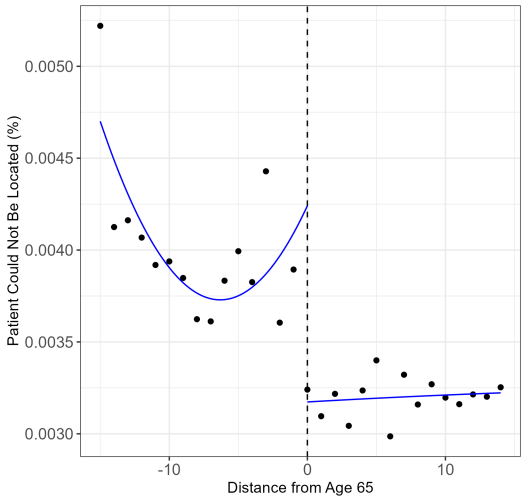
Variable	Full Sample:		Medicare Ineligible:		Medicare Eligible:	
	Mean	St. Dev.	Mean	St. Dev.	Mean	St. Dev.
Dependent Variables:						
Non-Traumatic Headache (%)	0.64	7.98	0.75	8.62	0.55	7.41
Non-Verifiable (%)	10.83	31.07	10.42	30.55	11.16	31.49
Verifiable (%)	1.61	12.59	2.00	13.99	1.30	11.32
Non-Verifiable - AI Generated (%)	12.36	32.91	11.92	32.40	12.72	33.32
Verifiable - AI Generated (%)	16.97	37.54	15.67	36.35	18.03	38.45
Other Variables:						
Age	65.35	8.53	57.17	4.27	71.98	4.34
Destination - Hospital (%)	91.98	27.17	92.87	25.74	91.25	28.25
Destination - Other Medical (%)	3.06	17.23	2.45	15.46	3.56	18.52
Destination - Home (%)	1.49	12.11	1.37	11.63	1.59	12.50
Destination - Other Government (%)	0.63	7.91	0.57	7.51	0.68	8.22
Destination - Unknown (%)	2.81	16.54	2.72	16.26	2.89	16.76
Advanced Life Support (%)	71.36	45.21	71.16	45.30	71.52	45.13
Payer - Medicare (%)	54.15	49.83	35.98	48.00	68.88	46.30
Payer - Private Insurance (%)	32.58	46.87	42.73	49.47	24.35	42.92
Payer - Self Pay (%)	12.28	32.82	20.15	40.11	5.89	23.55
Payer - Not Billed (%)	0.99	9.91	1.13	10.59	0.88	9.32
Race - White (%)	61.48	48.66	57.70	49.40	64.54	47.84
Gender - Male (%)	47.68	49.95	51.32	49.98	44.73	49.72
Urban Area (%)	74.41	43.64	75.83	42.81	73.25	44.27
Rural Area (%)	10.46	30.61	9.90	29.86	10.92	31.19
Region - East (%)	40.53	49.10	41.41	49.26	39.82	48.95
Region - North Central (%)	17.46	37.96	16.69	37.29	18.09	38.49
Region - South Central (%)	33.88	47.33	33.26	47.12	34.38	47.50
Region - West (%)	8.12	27.32	8.64	28.09	7.71	26.67
N	6,002,607		2,687,994		3,314,613	

Note: This table shows the summary statistics for the 2012 to 2016 NEMSIS data of 911 calls for ground CMS ambulance encounters for patients ages 50 to 79 who are transported by EMS and where the payer is known. This table is separated by encounters based on Medicare eligibility.

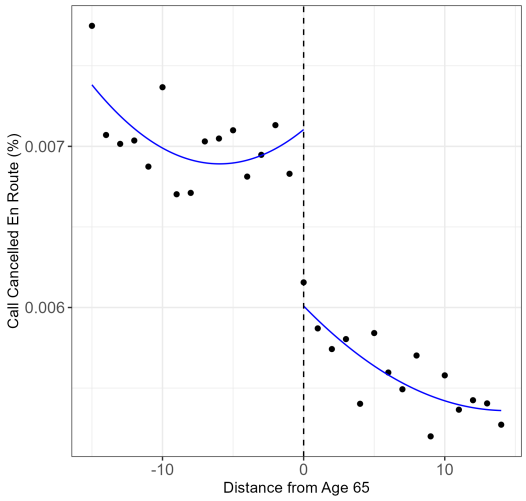
Online Appendix B Additional Results:

B.1 EMS Treatment and Transportation Choices:

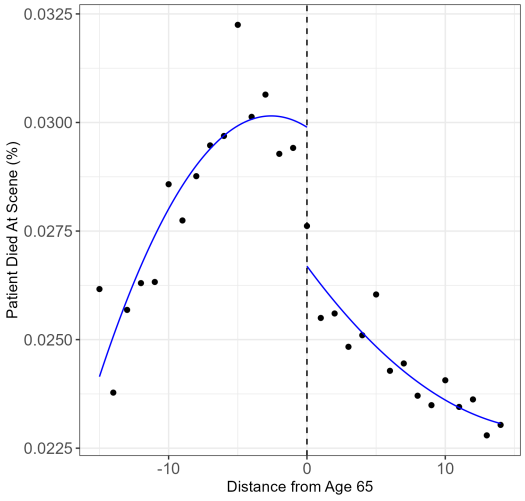
Figure B1: Regression Discontinuity Plots: Other EMS Encounter Types



(a) Patient Could Not Be Located



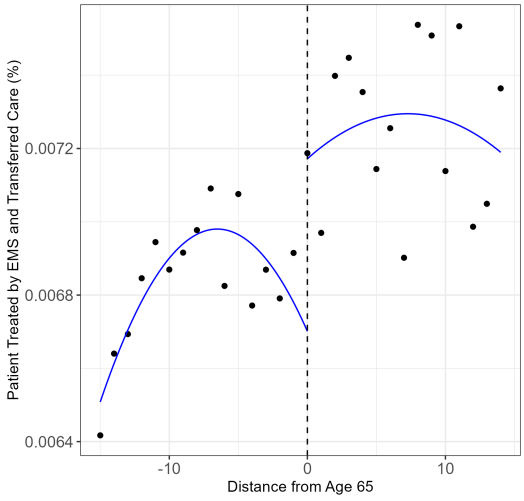
(b) Call Cancelled En Route



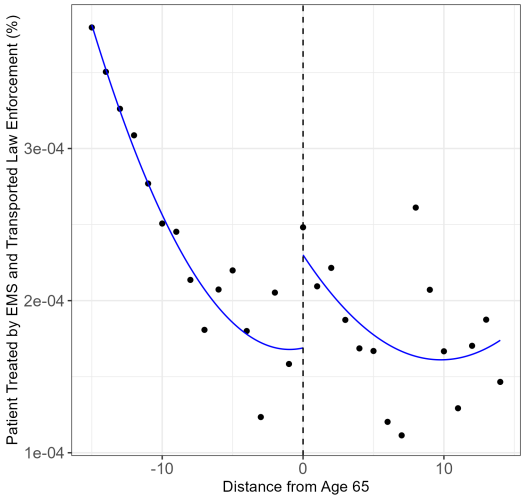
(c) Patient Died At Scene

Note: This figure plots the treatment and transportation decisions of 911 ground ambulance EMS encounters for bins of individuals ages 50 to 79 relative to Medicare eligibility. Panel (a) is the plot for whether the patient could not be located by EMS personnel, panel (b) is for whether the call was cancelled en route to the location, and panel (c) is for whether the patient died at the scene. The dashed line indicates zero distance from the threshold for Medicare eligibility (i.e., age 65). The left side of the dashed line is the distance to Medicare eligibility, and the right side of the dashed line is how far past Medicare eligibility the patient is.

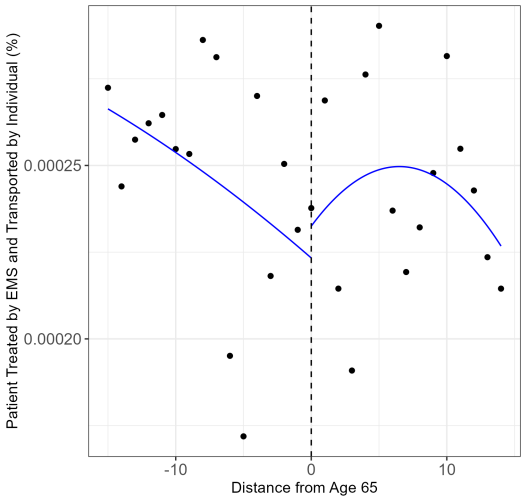
Figure B2: Regression Discontinuity Plots: Other EMS Treated Encounter Types



(a) Treated by EMS and Transferred Care



(b) Treated by EMS and Transported by Law Enforcement



(c) Treated by EMS and Transported by Private Vehicle

Note: This figure plots treatment and transportation decisions of 911 ground ambulance EMS encounters for bins of individuals ages 50 to 79 relative to Medicare eligibility. Panel (a) is the plot for whether the patient was treated by EMS and transferred care to another provider, panel (b) is for whether the patient was treated by EMS and transported by law enforcement, and panel (c) is for whether the patient was treated by EMS and transported by a private vehicle. The dashed line indicates zero distance from the threshold for Medicare eligibility (i.e., age 65). The left side of the dashed line is the distance to Medicare eligibility, and the right side of the dashed line is how far past Medicare eligibility the patient is.

Online Appendix C Medical Expenditure Panel Survey: Decomposing Patient Moral Hazard

The regression discontinuity estimates in Section 5.1 show that transportation by EMS disproportionately increases at age 65 and that this increase is primarily driven by a decrease in the patient refusal of care, which makes up 80% of the total increase in transports. This means that patient moral hazard makes up the largest component of the increase in transports at age 65.

As shown in Figure 2, there are two potential avenues for this increased ambulance usage from the patient perspective: (1) lower cost-sharing under Medicare and (2) Medicare's transportation requirement for ambulance services. While the second avenue for patient moral hazard is directly attributable to Medicare's reimbursement rules, the first avenue is unrelated to Medicare's reimbursement rules and therefore, it is important to determine the size of the patient moral hazard from the first avenue in order to truly understand the impact of Medicare's transportation requirement.

To determine how the reduction in cost-sharing translates into increased ambulance transports, I turn to the elasticity of ambulance services, which directly relates price changes to usage. As measured in Ellis et al. (2017), the elasticity for ambulance services is -0.07, which means that a 10% reduction in price will result in a 0.7% increase in ambulance usage. With an estimated price change, which in this setting is decreased cost-sharing, I can use this elasticity estimate to determine what portion of the decrease in the patient refusal of care is due to cost-sharing.

To determine the change in cost-sharing for ambulance services between Medicare and privately-insured/uninsured individuals, I use the Household Component of the Medical Expenditure Panel Survey (MEPS) data from 2012-2016. The HC-MEPS is a two-year panel survey of health expenditures, utilization, income, and health insurance coverage from individual households in a nationally representative sample.[52] I specifically use the event file, which documents the total expenditures and provides detailed breakdowns of expenditures by insurer and the individual for each medical event.[53] I specifically use the "other medical supplies" event file, which identifies ambulance events.

Within the ambulance events from 2012-2016 documented in the MEPS, I consider only individuals over the age of 50, which aligns with both my back-of-the-envelope calculation and overall analysis. I additionally only consider those 65 and older who only have Medicare and those 50-64 who are either privately insured or uninsured, which aligns with my NEMSIS sample. Utilizing the sample weights, I am left with a sample of roughly 2.3 million events for those 65 and over and 1.3 million events for those 50-64. The weighted average out-of-pocket payment for those 50-64 was \$186.77 (with a standard error of \$34.87), and for those 65 and over, the weighted average was \$157.50 (standard error \$45.46). Using these weighted averages implies a roughly 15.67% decrease in cost-sharing for those with Medicare. Combined with the elasticity estimate of -0.07, one should expect a roughly 1.1% increase in ambulance usage after individuals get Medicare due to the decrease in cost-sharing.

In Section 5.1, I found that the patient refusal of care made up roughly 1.92% of the 2.4% increase in patient transports. This means that the decrease in cost-sharing (increase of 1.1%) accounts for roughly 57% of the increase in patient transports due to patient moral hazard.

Interestingly, the percent of the ambulance encounter paid by the individual actually *increases* from 23.5% to 32.8% once individuals get Medicare. Utilizing this estimate would imply that 100% of the decrease in the patient refusal of care is due to the second component of patient moral hazard.

[52] For more information on the MEPS, please refer to https://meps.ahrq.gov/mepsweb/.

[53] For more information on the event files, please refer to https://meps.ahrq.gov/data_stats/more_info_download_data_files.jsp.

Online Appendix D Model Specification Sensitivity and Placebo Checks:

D.1 Kernel Choice:

To further assess the robustness of the results in 5, I examine the sensitivity of the RD estimates to different kernel choices. In my preferred specification, I use a uniform kernel, which assigns equal weight to all observations within the selected bandwidth, following the recommendation of Lee and Lemieux (2010). However, because the observations in my analysis are discrete and I use the smallest possible bandwidth (2.5), the choice of kernel is unlikely to significantly influence the results. This is because the limited range of observations near the cutoff minimizes the impact of the kernel's weighting function. To confirm this, I also conduct the analysis using triangular and Epanechnikov kernels. Table D1 presents the RD estimates and corresponding effective number of observations using these three kernel choices for the discontinuity at age 65, maintaining a bandwidth of 2.5.

Table D1: Regression Discontinuity Results: Comparing Kernels

	Uniform:	Obs:	Triangular:	Obs:	Epanechnikov:	Obs:
	Preferred Specification					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel A: EMS Treatment/Transportation Choices						
Treated-Transported	0.018***	1,589,779	0.018***	1,589,779	0.018***	1,589,779
Refused Care	−0.013***	1,589,779	−0.013***	1,589,779	−0.013***	1,589,779
No Treatment	−0.003***	1,589,779	−0.003***	1,589,779	−0.003***	1,589,779
Treated-Released	−0.001	1,589,779	−0.001	1,589,779	−0.001	1,589,779
	Uniform:	Obs:	Triangular:	Obs:	Epanechnikov:	Obs:
	Preferred Specification					
	(1)	(2)	(3)	(4)	(5)	(6)
Panel B: Condition Code Usage						
Reimbursable Codes: Condition Not-Verifiable	0.01***	1,227,342	0.01***	1,227,342	0.01***	1,227,342
Reimbursable Codes: Condition Verifiable	0.002***	1,227,342	0.002***	1,227,342	0.002***	1,227,342
Non-Reimbursable Code: Non-Traumatic Headache	0.001	1,227,342	0.001	1,227,342	0.001	1,227,342

Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. This table shows the results of the regression discontinuities at age 65 for 911 ALS/BLS calls varying the kernel used in estimation. Panel A presents results for EMS Treatment/Transportation Choices, while Panel B shows Condition Code Usage. Columns (1)-(2) use a uniform kernel, columns (3)-(4) use a triangular kernel, and columns (5)-(6) use a Epanechnikov. Even columns provide the RD estimates, and odd columns provide the corresponding effective number of observations. Column (1) corresponds to the estimates in Column (1) of Panel A in Table 5 (i.e., treatment/transport), and Table 6 (i.e., condition code usage). The bandwidth is 2.5. All standard errors and estimates are robust (Calonico et al., 2014, 2019).

As evident from Table D1, the results are virtually identical across all kernel choices for both Panel A (EMS Treatment/Transportation Choices) and Panel B (Condition Code Usage). This consistency is expected given the discrete nature of the running variable (age) in the NEMSIS data and the use of the smallest possible bandwidth. The data structure and estimation approach effectively restrict the analysis to observations closest to the cutoff, rendering the weighting schemes of different kernels functionally equivalent. This finding reinforces the robustness of the RD estimates, as they are not sensitive to the choice of kernel in this context.

D.2 Condition Code Classification Sensitivity Analysis:

Table D2: Regression Discontinuity Models for Condition Code Usage: Sensitivity Check

Panel A: No Controls

	Reimbursable Codes: Condition Not-Verifiable Preferred Specification	Reimbursable Codes: Condition Not-Verifiable AI Determined	Reimbursable Codes: Condition Verifiable Preferred Specification	Reimbursable Codes: Condition Verifiable AI Determined
	(1)	(2)	(3)	(4)
Over Age 65	0.01***	0.009***	0.002***	0.001
	(0.002)	(0.002)	(0.001)	(0.003)
Bandwidth	2.5	2.5	2.5	2.5
Effective Observations	1,227,342	1,227,342	1,227,342	1,227,342

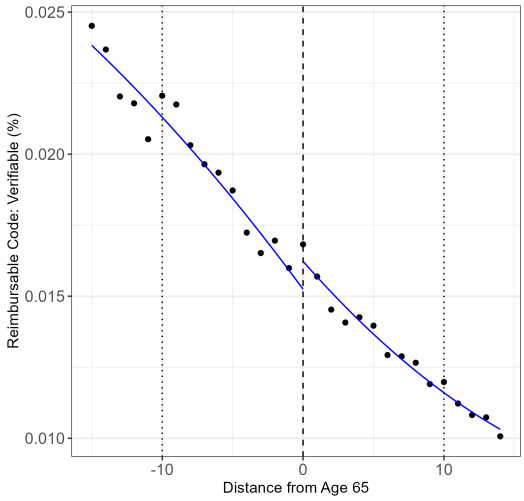
Panel B: Controls

	Reimbursable Codes: Condition Not-Verifiable Preferred Specification	Reimbursable Codes: Condition Not-Verifiable AI Determined	Reimbursable Codes: Condition Verifiable Preferred Specification	Reimbursable Codes: Condition Verifiable AI Determined
	(1)	(2)	(3)	(4)
Over Age 65	0.008***	0.006***	0.002**	0
	(0.002)	(0.002)	(0.001)	(0.003)
Bandwidth	2.5	2.5	2.5	2.5
Effective Observations	1,227,342	1,227,342	1,227,342	1,227,342

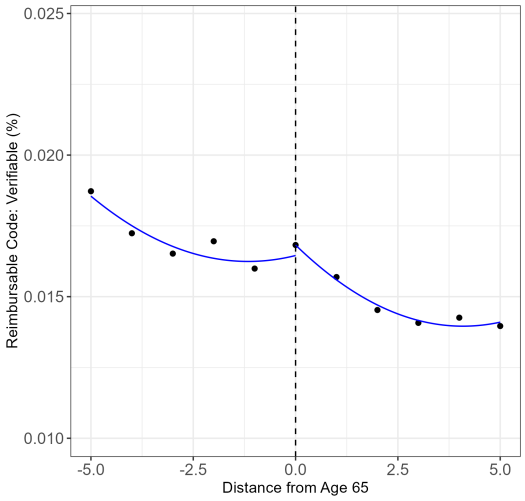
Note: $^{*}p < 0.1$; $^{**}p < 0.05$; $^{***}p < 0.01$. This table shows the results of regression discontinuities at age 65 for condition code usage during 911 ALS/BLS calls that resulted in EMS transport for individuals aged 50-79. Columns (1) and (3) present the main analysis results for Medicare reimbursable condition codes based on verifiability at the emergency department, corresponding to the determinations used in the primary analysis. Columns (2) and (4) show sensitivity check results using AI-determined condition code classifications. Columns (1) and (2) examine codes deemed not easily verifiable, while columns (3) and (4) focus on easily verifiable codes. The kernel is uniform (as recommended in Lee, 2010) and the bandwidth is 2.5. Panel A presents results without additional covariates, while Panel B includes demographic, temporal, geographic, and operational controls (detailed in Section 4.4). All standard errors and estimates are robust (Calonico et al., 2014, 2019). The full list of condition codes and their verifiability classifications for the odd columns can be found in Table 3. For the even columns (sensitivity check), the classifications are in Table A1 in Appendix E.2.

D.3 Placebo Check: Standardized Axes

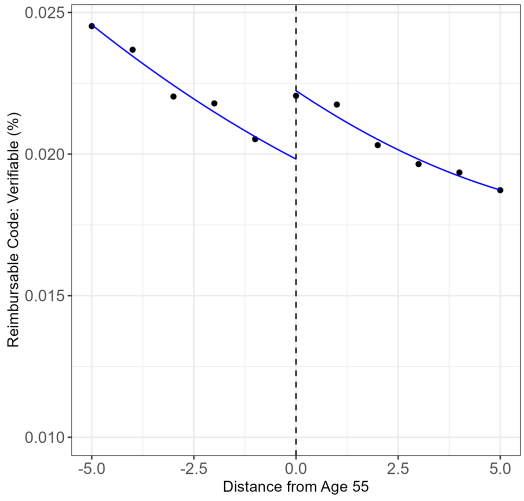
Figure D1: Regression Discontinuity Plots: Verifiable Reimbursable Codes



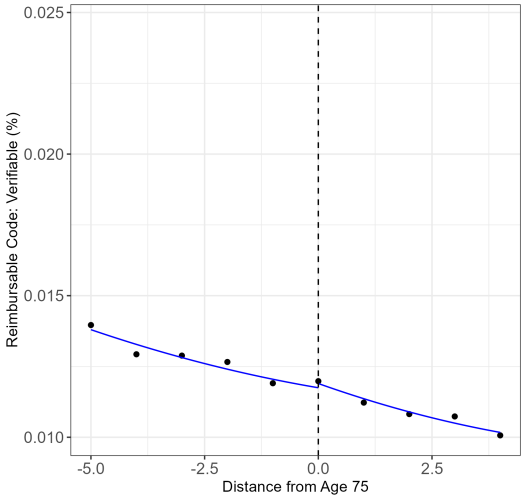
(a) Ages 50 to 79: Threshold Age 65



(b) Ages 60 to 70: Threshold Age 65



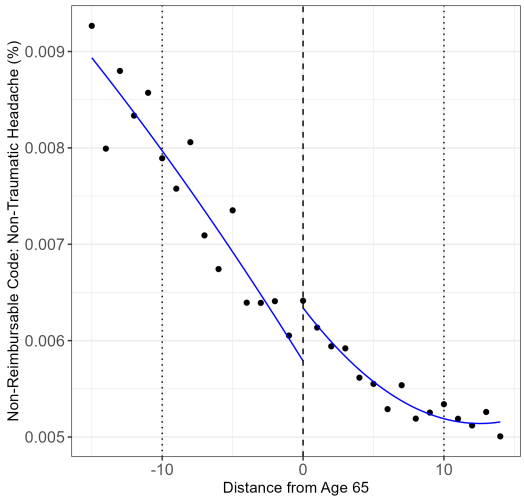
(c) Ages 50 to 60: Threshold Age 55



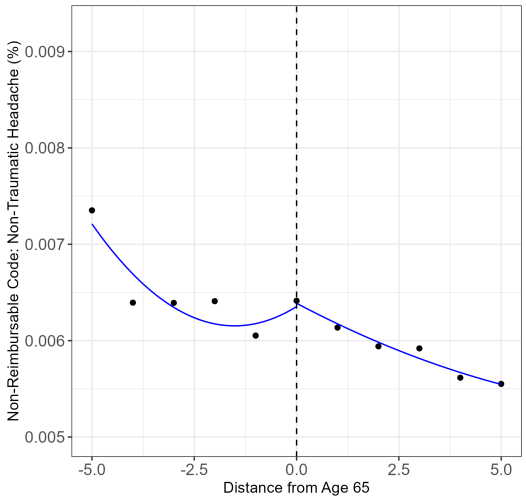
(d) Ages 70 to 79: Threshold Age 75

Note: This figure shows the regression discontinuity plots for whether a patient that was treated and transported by EMS during a 911 ground encounter had a condition code that was likely reimbursable but verifiable upon arrival at the emergency department. Panel (a) is the plot for the entire age distribution with the discontinuity at age 65 (i.e., Medicare eligibility). The dotted lines indicate ages 55 (-10 distance from age 65), and 75 (10 distance from age 65), which will be used as a placebo check. Panel (b) shows the distribution for ages 60 to 70 with the discontinuity at Medicare eligibility (i.e., age 65). Panels (c) and (d) are placebo checks at alternative ages. Panel (c) is the distribution for ages 50 to 60, and the discontinuity is at age 55. Panel (d) is the distribution for ages 70 to 80, and the discontinuity is at age 75. The dashed line indicates zero distance from the threshold.

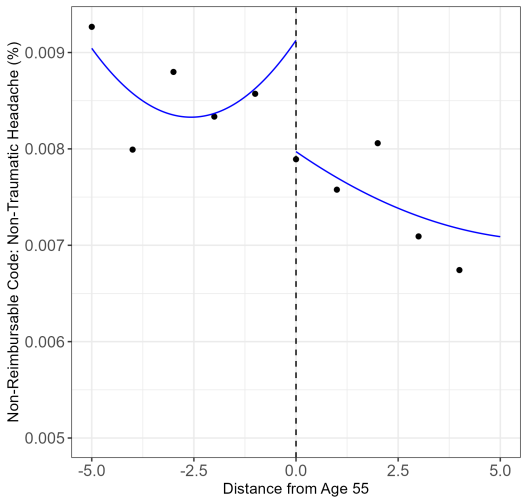
Figure D2: Regression Discontinuity Plots: Non-Reimbursable Non-Traumatic Headache



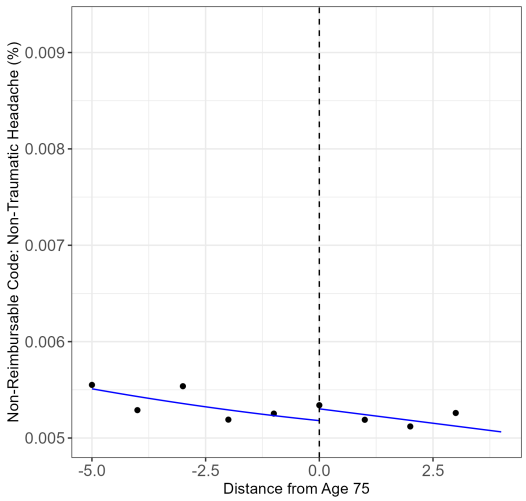
(a) Ages 50 to 79: Threshold Age 65



(b) Ages 60 to 70: Threshold Age 65



(c) Ages 50 to 60: Threshold Age 55



(d) Ages 70 to 79: Threshold Age 75

Note: This figure shows the regression discontinuity plots for whether a patient that was treated and transported by EMS during a 911 ground encounter had the condition code for non-traumatic headache, which is never reimbursable. Panel (a) is the plot for the entire age distribution with the discontinuity at age 65 (i.e., Medicare eligibility). The dotted lines indicate ages 55 (-10 distance from age 65), and 75 (10 distance from age 65), which will be used as a placebo check. Panel (b) shows the distribution for ages 60 to 70 with the discontinuity at Medicare eligibility (i.e., age 65). Panels (c) and (d) are placebo checks at alternative ages. Panel (c) is the distribution for ages 50 to 60, and the discontinuity is at age 55. Panel (d) is the distribution for ages 70 to 80, and the discontinuity is at age 75. The dashed line indicates zero distance from the threshold.

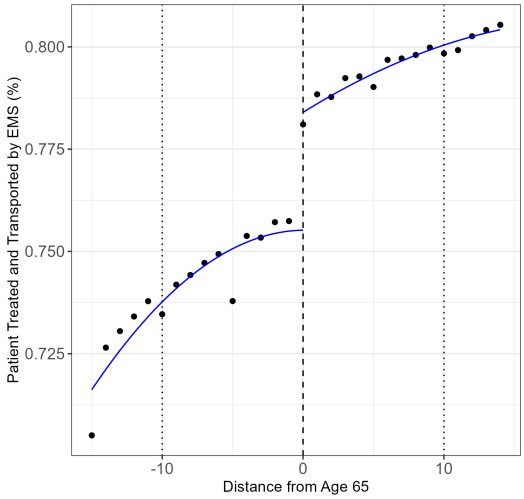
D.4 Placebo Check: Non-Standardized Axes

To ensure that the observed discontinuity at age 65 is due to Medicare eligibility rather than underlying non-linearities in the data, I conduct placebo tests at ages 55 and 75. These ages were chosen as they are equidistant from the Medicare eligibility age and also both end in '5', which could potentially capture any systematic effects related to age milestones or reporting. Additionally, discontinuities should be present at age 75 if something other than Medicare eligibility is driving the results, as most individuals ages 72 to 77 have Medicare.

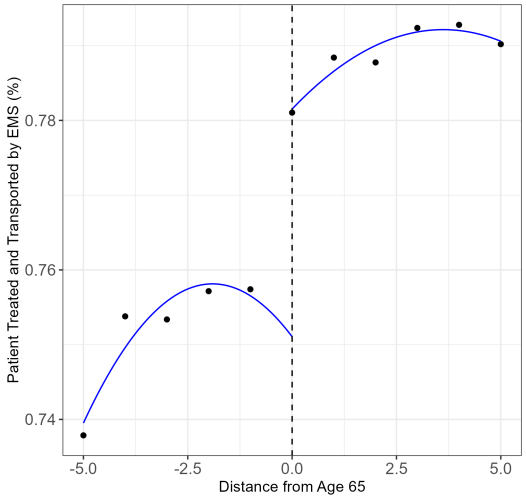
Figures D3 through D8 present regression discontinuity plots for our key outcomes at the true threshold (age 65) and the placebo thresholds (ages 55 and 75). Each figure contains four panels: (a) the full age distribution (50-79) with the true threshold highlighted, (b) the true threshold (65) with a 5-year bandwidth on either side, (c) the first placebo threshold (55) with a 5-year bandwidth, and (d) the second placebo threshold (75) with a 5-year bandwidth. Figure D3 shows the results for patients treated and transported by EMS. While there is a clear discontinuity at age 65 (panels a and b), no such discontinuity is apparent at ages 55 or 75 (panels c and d). This pattern is consistent across our other key outcomes: patient refused care (Figure D4), patient required no treatment (Figure D5), use of non-verifiable reimbursable codes (Figure D6), use of verifiable reimbursable codes (Figure D7), and use of non-reimbursable non-traumatic headache code (Figure D8).

The absence of discontinuities at the placebo thresholds provides evidnece that the effects observed at age 65 are indeed due to Medicare eligibility and not to other age-related factors or data artifacts. This placebo check, combined with the earlier robustness tests, provides strong support for the validity of the main findings.

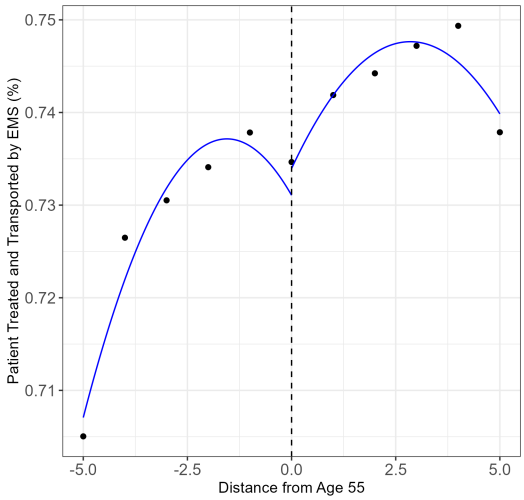
Figure D3: Regression Discontinuity Plots: Treated and Transported by EMS



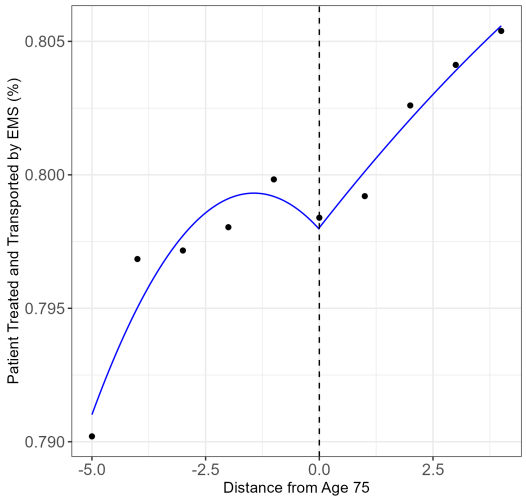
(a) Ages 50 to 79: Threshold Age 65



(b) Ages 60 to 70: Threshold Age 65



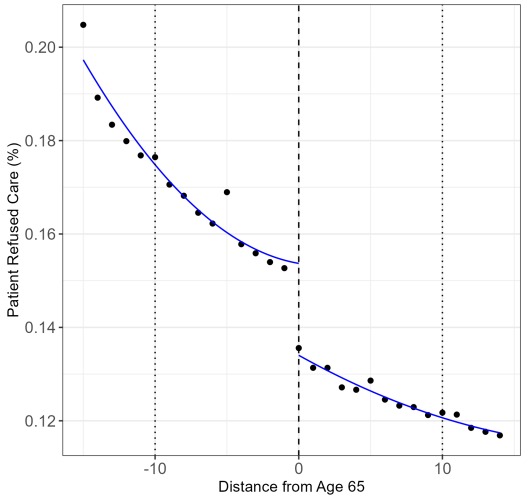
(c) Ages 50 to 60: Threshold Age 55



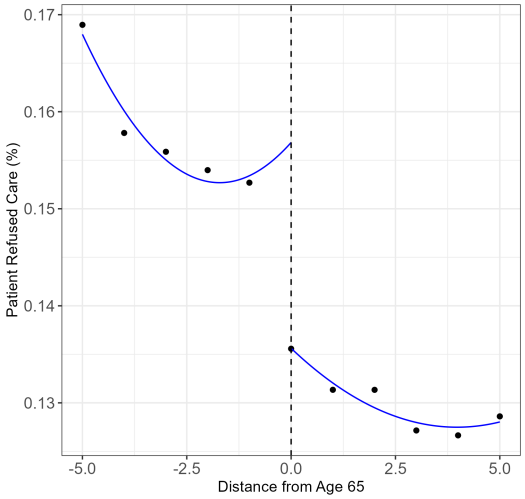
(d) Ages 70 to 79: Threshold Age 75

Note: This figure shows the regression discontinuity plots for whether a 911 ground encounter resulted in the patient being treated and transported by EMS. Panel (a) is the plot for the entire age distribution with the discontinuity at age 65 (i.e., Medicare eligibility). The dotted lines indicate ages 55 (-10 distance from age 65), and 75 (10 distance from age 65), which will be used as a placebo check. Panel (b) shows the distribution for ages 60 to 70 with the discontinuity at Medicare eligibility (i.e., age 65). Panels (c) and (d) are placebo checks at alternative ages. Panel (c) is the distribution for ages 50 to 60, and the discontinuity is at age 55. Panel (d) is the distribution for ages 70 to 80, and the discontinuity is at age 75. The dashed line indicates zero distance from the threshold.

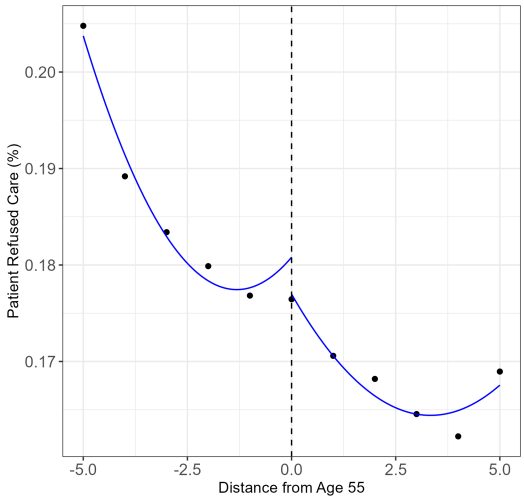
Figure D4: Regression Discontinuity Plots: Patient Refused Care



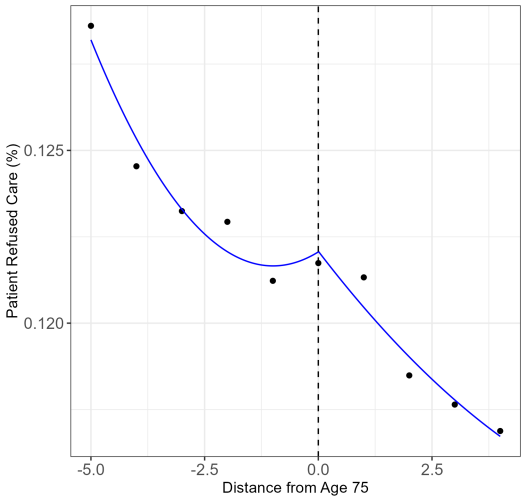
(a) Ages 50 to 79: Threshold Age 65



(b) Ages 60 to 70: Threshold Age 65



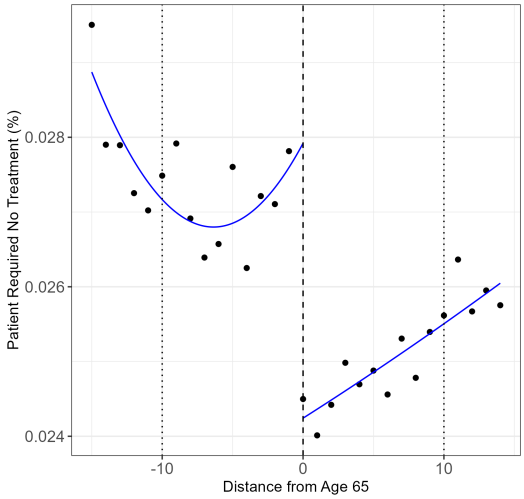
(c) Ages 50 to 60: Threshold Age 55



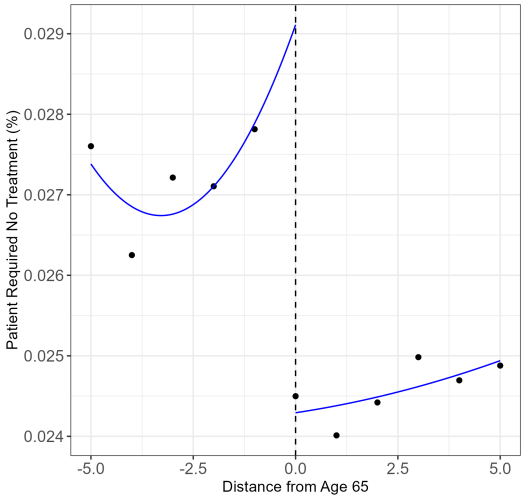
(d) Ages 70 to 79: Threshold Age 75

Note: This figure shows the regression discontinuity plots for whether a 911 ground encounter resulted in the patient refusing care by EMS. Panel (a) is the plot for the entire age distribution with the discontinuity at age 65 (i.e., Medicare eligibility). The dotted lines indicate ages 55 (-10 distance from age 65), and 75 (10 distance from age 65), which will be used as a placebo check. Panel (b) shows the distribution for ages 60 to 70 with the discontinuity at Medicare eligibility (i.e., age 65). Panels (c) and (d) are placebo checks at alternative ages. Panel (c) is the distribution for ages 50 to 60, and the discontinuity is at age 55. Panel (d) is the distribution for ages 70 to 80, and the discontinuity is at age 75. The dashed line indicates zero distance from the threshold.

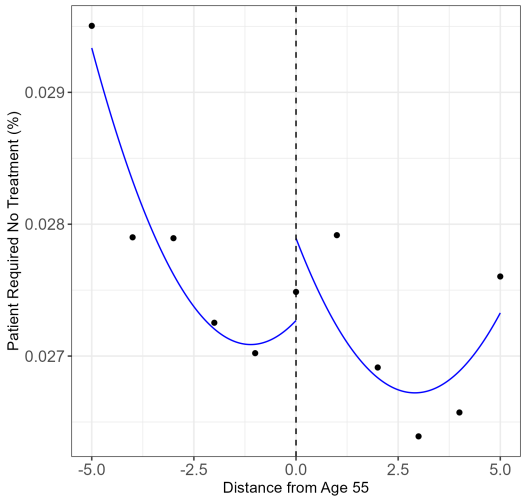
Figure D5: Regression Discontinuity Plots: Patient Required No Treatment



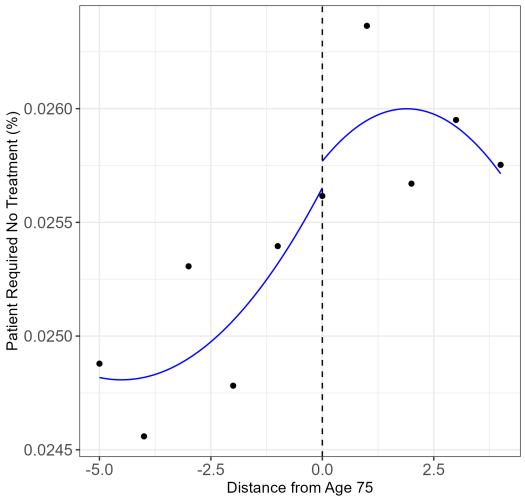
(a) Ages 50 to 79: Threshold Age 65



(b) Ages 60 to 70: Threshold Age 65



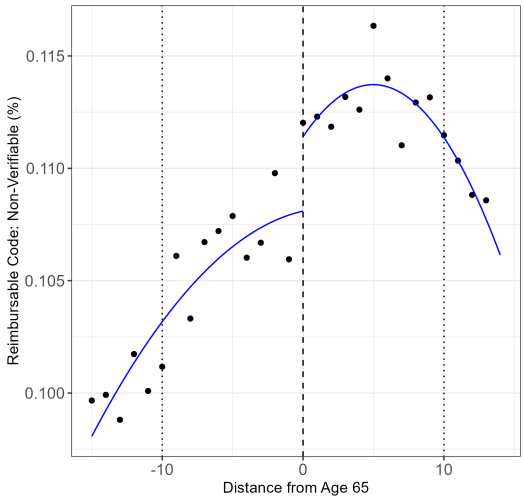
(c) Ages 50 to 60: Threshold Age 55



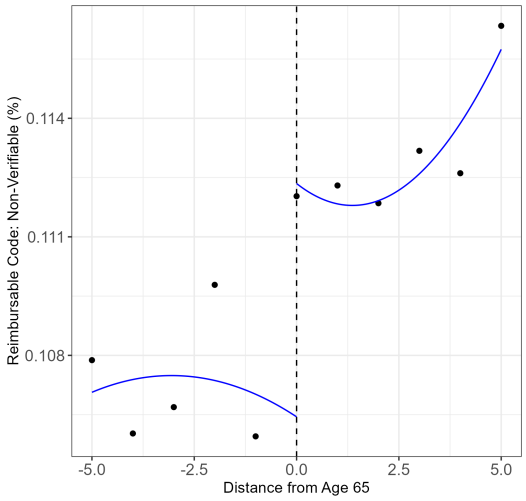
(d) Ages 70 to 79: Threshold Age 75

Note: This figure shows the regression discontinuity plots for whether a patient during a 911 ground encounter did not require treatment by EMS. Panel (a) is the plot for the entire age distribution with the discontinuity at age 65 (i.e., Medicare eligibility). The dotted lines indicate ages 55 (-10 distance from age 65), and 75 (10 distance from age 65), which will be used as a placebo check. Panel (b) shows the distribution for ages 60 to 70 with the discontinuity at Medicare eligibility (i.e., age 65). Panels (c) and (d) are placebo checks at alternative ages. Panel (c) is the distribution for ages 50 to 60, and the discontinuity is at age 55. Panel (d) is the distribution for ages 70 to 80, and the discontinuity is at age 75. The dashed line indicates zero distance from the threshold.

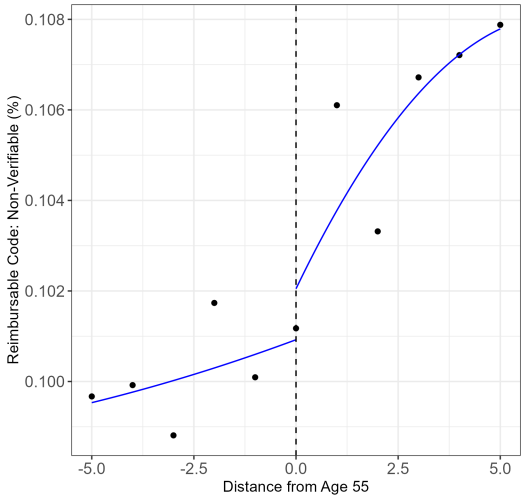
Figure D6: Regression Discontinuity Plots: Non-Verifiable Reimbursable Codes



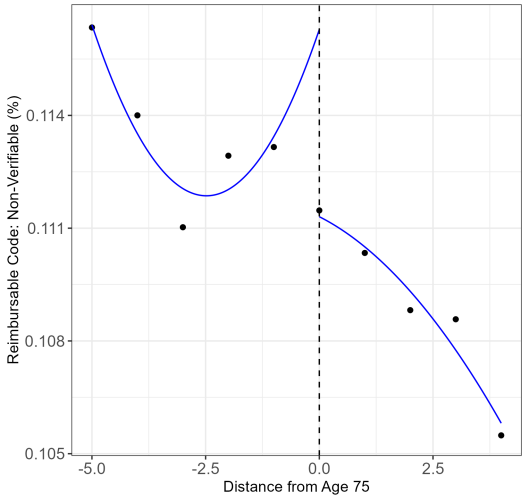
(a) Ages 50 to 79: Threshold Age 65



(b) Ages 60 to 70: Threshold Age 65



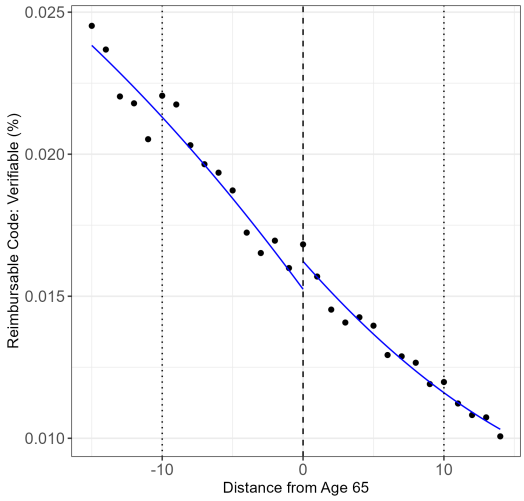
(c) Ages 50 to 60: Threshold Age 55



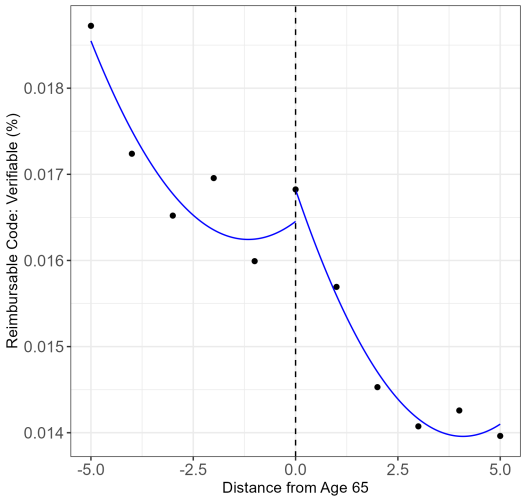
(d) Ages 70 to 79: Threshold Age 75

Note: This figure shows the regression discontinuity plots for whether a patient that was treated and transported by EMS during a 911 ground encounter had a condition code that was likely reimbursable but non-verifiable upon arrival at the emergency department. Panel (a) is the plot for the entire age distribution with the discontinuity at age 65 (i.e., Medicare eligibility). The dotted lines indicate ages 55 (-10 distance from age 65), and 75 (10 distance from age 65), which will be used as a placebo check. Panel (b) shows the distribution for ages 60 to 70 with the discontinuity at Medicare eligibility (i.e., age 65). Panels (c) and (d) are placebo checks at alternative ages. Panel (c) is the distribution for ages 50 to 60, and the discontinuity is at age 55. Panel (d) is the distribution for ages 70 to 80, and the discontinuity is at age 75. The dashed line indicates zero distance from the threshold.

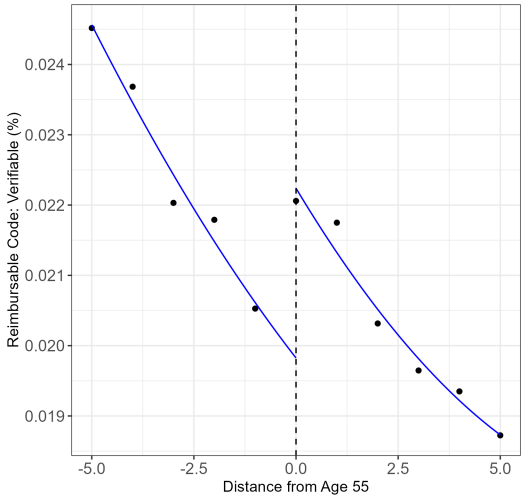
Figure D7: Regression Discontinuity Plots: Verifiable Reimbursable Codes



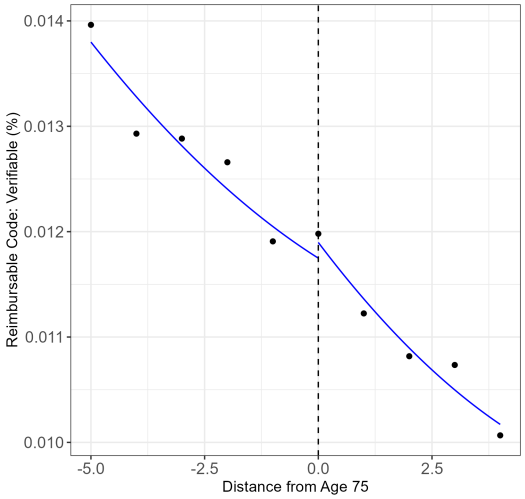
(a) Ages 50 to 79: Threshold Age 65



(b) Ages 60 to 70: Threshold Age 65



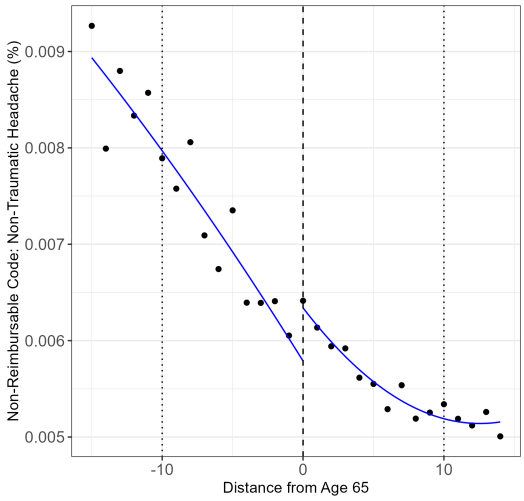
(c) Ages 50 to 60: Threshold Age 55



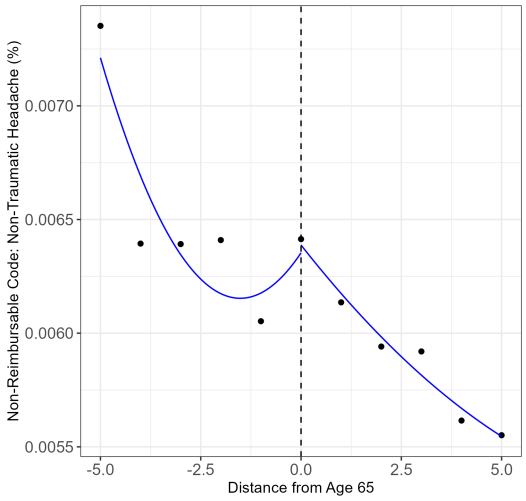
(d) Ages 70 to 79: Threshold Age 75

Note: This figure shows the regression discontinuity plots for whether a patient that was treated and transported by EMS during a 911 ground encounter had a condition code that was likely reimbursable but verifiable upon arrival at the emergency department. Panel (a) is the plot for the entire age distribution with the discontinuity at age 65 (i.e., Medicare eligibility). The dotted lines indicate ages 55 (-10 distance from age 65), and 75 (10 distance from age 65), which will be used as a placebo check. Panel (b) shows the distribution for ages 60 to 70 with the discontinuity at Medicare eligibility (i.e., age 65). Panels (c) and (d) are placebo checks at alternative ages. Panel (c) is the distribution for ages 50 to 60, and the discontinuity is at age 55. Panel (d) is the distribution for ages 70 to 80, and the discontinuity is at age 75. The dashed line indicates zero distance from the threshold.

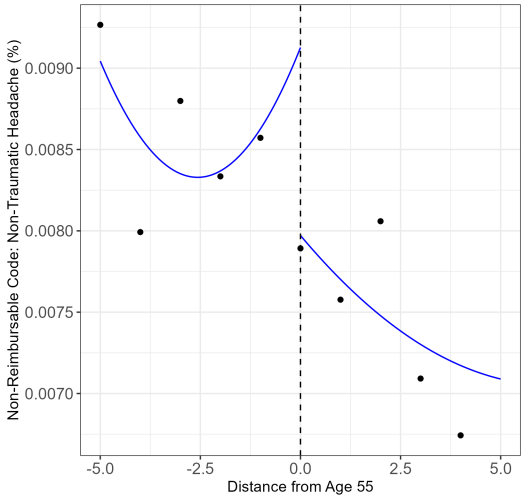
Figure D8: Regression Discontinuity Plots: Non-Reimbursable Non-Traumatic Headache



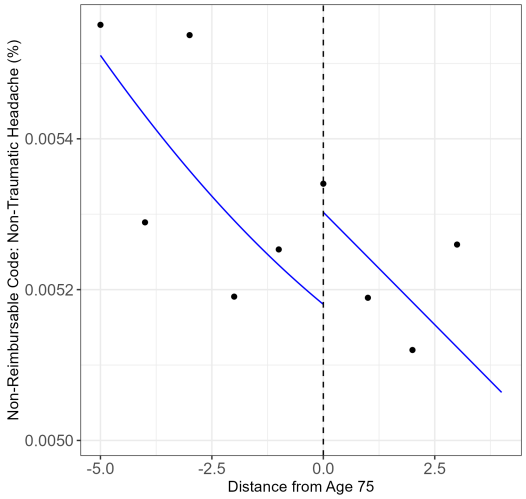
(a) Ages 50 to 79: Threshold Age 65



(b) Ages 60 to 70: Threshold Age 65



(c) Ages 50 to 60: Threshold Age 55



(d) Ages 70 to 79: Threshold Age 75

Note: This figure shows the regression discontinuity plots for whether a patient that was treated and transported by EMS during a 911 ground encounter had the condition code for non-traumatic headache, which is never reimbursable. Panel (a) is the plot for the entire age distribution with the discontinuity at age 65 (i.e., Medicare eligibility). The dotted lines indicate ages 55 (-10 distance from age 65), and 75 (10 distance from age 65), which will be used as a placebo check. Panel (b) shows the distribution for ages 60 to 70 with the discontinuity at Medicare eligibility (i.e., age 65). Panels (c) and (d) are placebo checks at alternative ages. Panel (c) is the distribution for ages 50 to 60, and the discontinuity is at age 55. Panel (d) is the distribution for ages 70 to 80, and the discontinuity is at age 75. The dashed line indicates zero distance from the threshold.

Online Appendix E Condition Code Usage Descriptions:

E.1 Condition Code Selection:

To categorize condition codes as being likely reimbursable by Medicare vs. unlikely to be reimbursable by Medicare, I utilized the Ambulance Services guidance provided by CGS (CGS Administrators, LLC, 2017). I referred to the "Beneficiary's Condition," guidance section, which lists ten broad categories of illness/injury which likely contraindicated transportation by means other than an ambulance. This guidance is highlighted in Figure E1. Using these ten broad categories, I manually examined the potential condition codes listed in the NEMSIS data dictionary. Those that fell broadly into one of these ten categories were listed as being likely reimbursable by Medicare if a transport occurred.

Figure E1: CGS Reimbursable Transport Guidelines:

FACT SHEET

Ambulance Services

The ambulance benefit is defined in title XVIII of the Social Security Act in §1861(s)(7) which establishes coverage for "medical and other health services" named in the statute, including: "ambulance service where the use of other methods of transportation is contraindicated by the individuals' condition, but only to the extent provided in regulations." http://www.ssa.gov/OP_Home/ssact/title18/1861.htm

The nature of an ambulance's response (whether emergency or not) does not independently establish or support medical necessity for an ambulance transport. Rather, Medicare coverage always depends on, among other things, whether the service(s) furnished is actually medically reasonable and necessary based on the patient's condition at the time of transport.

Definition of Ambulance Services

There are several categories of ground ambulance services and two categories of air ambulance services under the fee schedule. (Note that "ground" refers to both land and water transportation.) *All ground and air ambulance transportation services must meet all requirements regarding medical reasonableness and necessity as outlined in the applicable statute, regulations, and manual provisions.*

Medical Necessity

- Medical necessity is established when the patient's condition is such that use of any other method of transportation is contraindicated. In any case in which some means of transportation other than an ambulance could be used without endangering the individual's health, whether or not such other transportation is actually available, no payment may be made for ambulance services. In all cases, the appropriate documentation must be kept on file and, upon request, presented to the carrier/intermediary. It is important to note that the presence (or absence) of a physician's order for a transport by ambulance does not necessarily prove (or disprove) whether the transport was medically necessary. The ambulance service must meet all program coverage criteria in order for payment to be made.
- In addition, the reason for the ambulance transport must be medically necessary. That is, the transport must be to obtain a Medicare covered service, or to return from such a service.

Reasonableness

Payment under the Ambulance Fee Schedule is made according to the level of medically necessary services actually furnished. That is, payment is based on the level of service furnished (provided they were medically necessary), not simply on the vehicle used. Even if a local government requires an ALS response for all calls, payment under Medicare is made only for the level of service furnished, and then only when the service is medically necessary.

Vehicle Requirement for Basic Life Support and Advanced Life Support

- Basic Life Support (BLS) ambulances must be staffed by at least two people, *who meet the requirements of state and local laws where the services are being furnished and where,* at least one of whom must
  1. Be certified at a minimum as an emergency medical technician-basic (EMT-basic) by the state or local authority where the services are being furnished and
  2. Be legally authorized to operate all lifesaving and life-sustaining equipment on board the vehicle.

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This Fact Sheet is for informational purposes only and is not intended to guarantee payment for services, all services submitted to Medicare must meet Medical Necessity guidelines. Ambulance transport may be covered under Medicare to the extent and under the conditions described in the Social Security Act, including Section 1861(s)(7) (http://www.ssa.gov/OP_Home/ssact/title18/1862.htm).

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FACT SHEET

Ambulance Services

Bed Confinement

A beneficiary is considered bed-confined if he/she is:

- Unable to get up from bed without assistance;
- Unable to ambulate; and
- Unable to sit in a chair or wheelchair.

The term "bed confined" is not synonymous with "bed rest" or "nonambulatory." Bed-confinement, by itself, is neither sufficient nor is it necessary to determine the coverage for Medicare ambulance benefits. It is simply one element of the beneficiary's condition that may be taken into account in the CGS's (or another Medicare contractor's) determination of whether means of transport other than an ambulance were contraindicated.

- Advanced Life Support (ALS) vehicles must be staffed by at least two people, *who meet the requirements of state and local laws where* the services are being furnished and where at least one of whom must:
  1. *Meet the vehicle staff requirements above for BLS vehicles and*
  2. Be certified as an EMT-Intermediate or an EMT-Paramedic by the state or local authority *where the services are being furnished to perform one or more ALS services.*

Beneficiary's Condition

Beneficiary was suffering from an illness or injury which contraindicated transportation by other means. Examples include:

- Transported in an emergency situation (i.e., result of accident, injury or acute illness)
- Needed to be restrained to prevent injury to the beneficiary or others
- Was unconscious or in shock
- Required oxygen or other emergency treatment during transport to nearest facility
- Exhibits signs and symptoms of acute respiratory distress or cardiac distress such as shortness of breath or chest pain
- Exhibits signs and symptoms that indicated the possibility of acute stroke
- Had to remain immobile because of a fracture that had not been set or the possibility of a fracture
- Is experiencing severe hemorrhage
- Could be moved only by stretcher
- Was bed-confined before and after the ambulance trip

In the absence of any of the conditions listed above, additional documentation should be obtained to establish medical need.

Beneficiary Signature Requirements

Medicare requires the signature of the beneficiary, or that of his or her representative, for both the purpose of accepting assignment and submitting a claim to Medicare. If the beneficiary is unable to sign because of a mental or physical condition, the following individuals may sign the claim form on behalf of the beneficiary:

- The beneficiary's legal guardian.
- A relative or other person who receives social security or other governmental benefits on behalf of the beneficiary.
- A relative or other person who arranges for the beneficiary's treatment or exercises other responsibility for his or her affairs.

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FACT SHEET

Ambulance Services

Ambulance Service to Physician's Office

These trips are covered only under the following circumstances:

- The ambulance transport is en route to a Medicare covered destination as described in §10.3; and
- During the transport, the ambulance stops at a physician's office because of the patient's dire need for professional attention, and immediately thereafter, the ambulance continues to the covered destination.

In such cases, the patient will be deemed to have been transported directly to a covered destination and payment may be made for a single transport and the entire mileage of the transport, including any additional mileage traveled because of the stop at the physician's office.

- A representative of an agency or institution that did not furnish the services for which payment is claimed, but furnished other care, services, or assistance to the beneficiary.
- A representative of the provider or of the nonparticipating hospital claiming payment for services it has furnished, if the provider or nonparticipating hospital is unable to have the claim signed in accordance with 42 CFR 424.36(b) (1 – 4).
- A representative of the ambulance provider or supplier who is present during an emergency and/or nonemergency transport, provided that the ambulance provider or supplier maintains certain documentation in its records for at least 4 years from the date of service. A provider/supplier (or his/her employee) cannot request payment for services furnished except under circumstances fully documented to show that the beneficiary is unable to sign and that there is no other person who could sign.

Medicare does not require that the signature to authorize claim submission be obtained at the time of transport for the purpose of accepting assignment of Medicare payment for ambulance benefits. When a provider/supplier is unable to obtain the signature of the beneficiary, or that of his or her representative, at the time of transport, it may obtain this signature any time prior to submitting the claim to Medicare for payment. (**Note:** There is a 12 month period for filing a Medicare claim, depending upon the date of service.)

If the beneficiary/representative refuses to authorize the submission of a claim, including a refusal to furnish an authorizing signature, then the ambulance provider/supplier may not bill Medicare, but may bill the beneficiary (or his or her estate) for the full charge of the ambulance items and services furnished. If, after seeing this bill, the beneficiary/representative decides to have Medicare pay for these items and services, then a beneficiary/representative signature is required and the ambulance provider/supplier must afford the beneficiary/representative this option within the claims filing period.

Air Ambulance Services

Medically appropriate air ambulance transportation is a covered service regardless of the State or region in which it is rendered. However, contractors approve claims only if the beneficiary's medical condition is such that transportation by either basic or advanced life support ground ambulance is not appropriate.

There are two categories of air ambulance services: fixed wing (airplane) and rotary wing (helicopter) aircraft. The higher operational costs of the two types of aircraft are recognized with two distinct payment amounts for air ambulance mileage. The air ambulance mileage rate is calculated per actual loaded (patient onboard) miles flown and is expressed in statute miles (not nautical miles).

- **Fixed Wing (FW):** Furnished when the beneficiary's medical condition is such that transport by ground ambulance, in whole or in part, is not appropriate. Generally, transport by fixed wing air ambulance may be necessary because the beneficiary's condition requires rapid transport to a treatment facility, and either great distances or other obstacles, e.g., heavy traffic, preclude such rapid delivery to the nearest appropriate facility. Transport by fixed wing air ambulance may also be necessary because the beneficiary is inaccessible by a ground or water ambulance vehicle.

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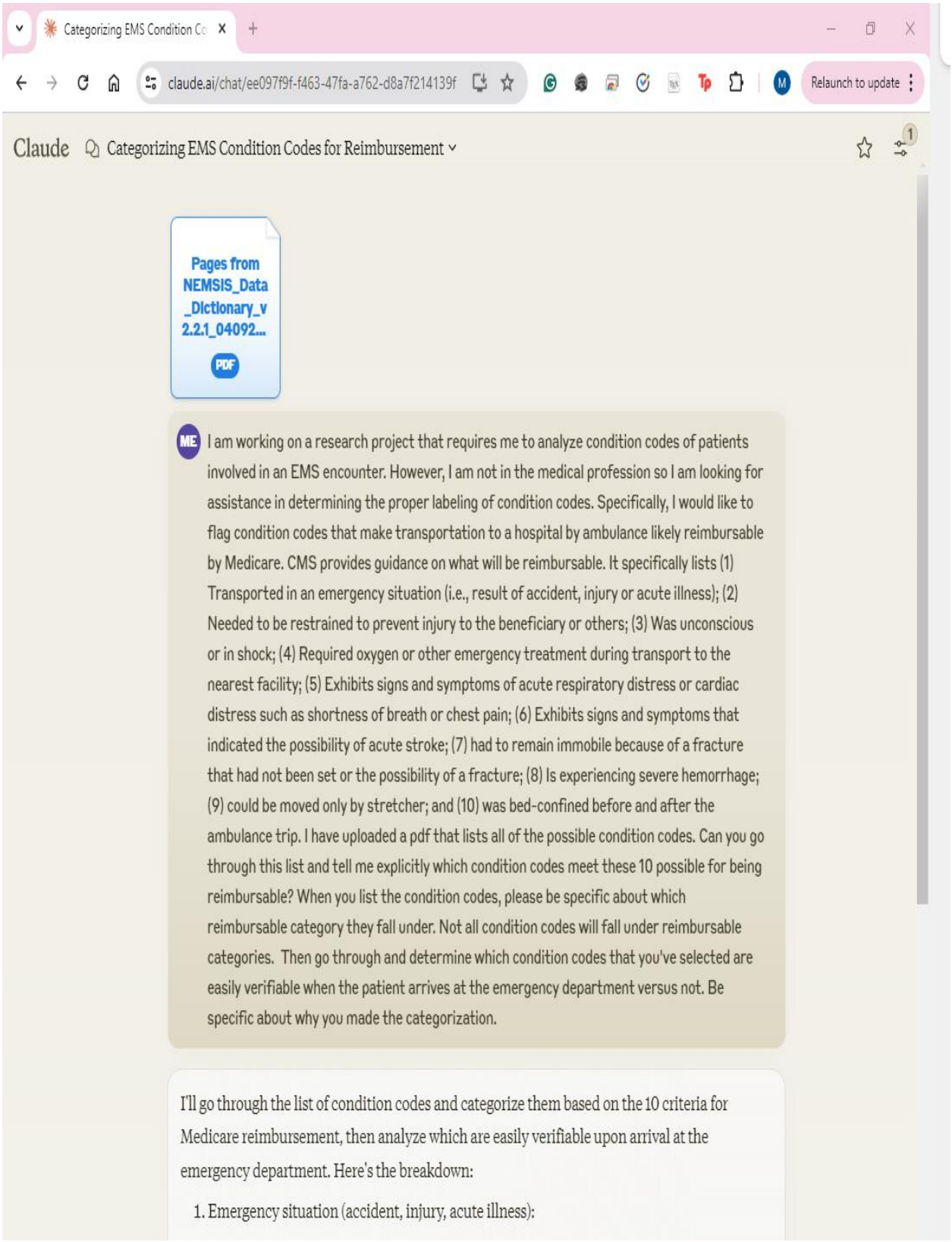
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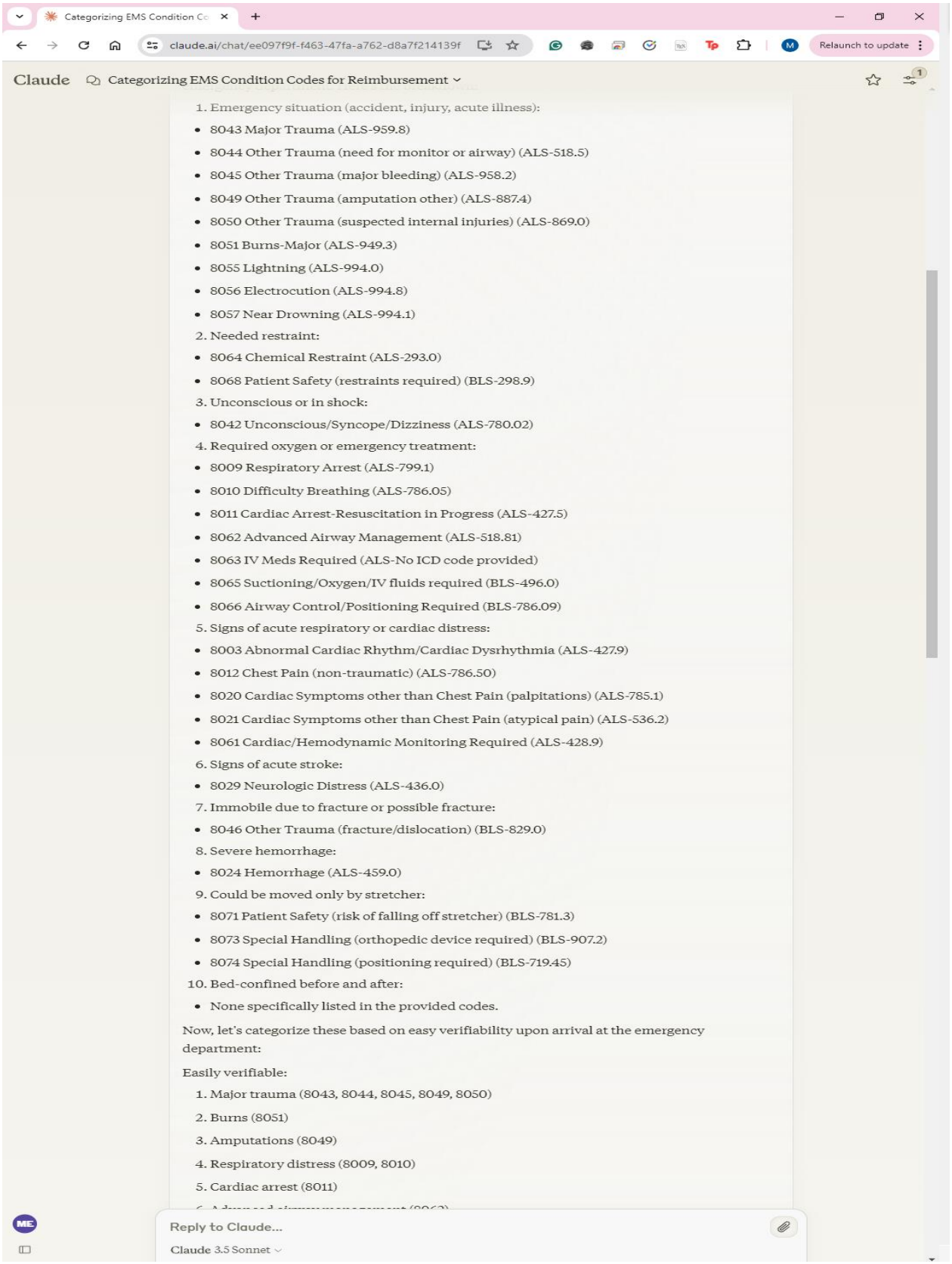
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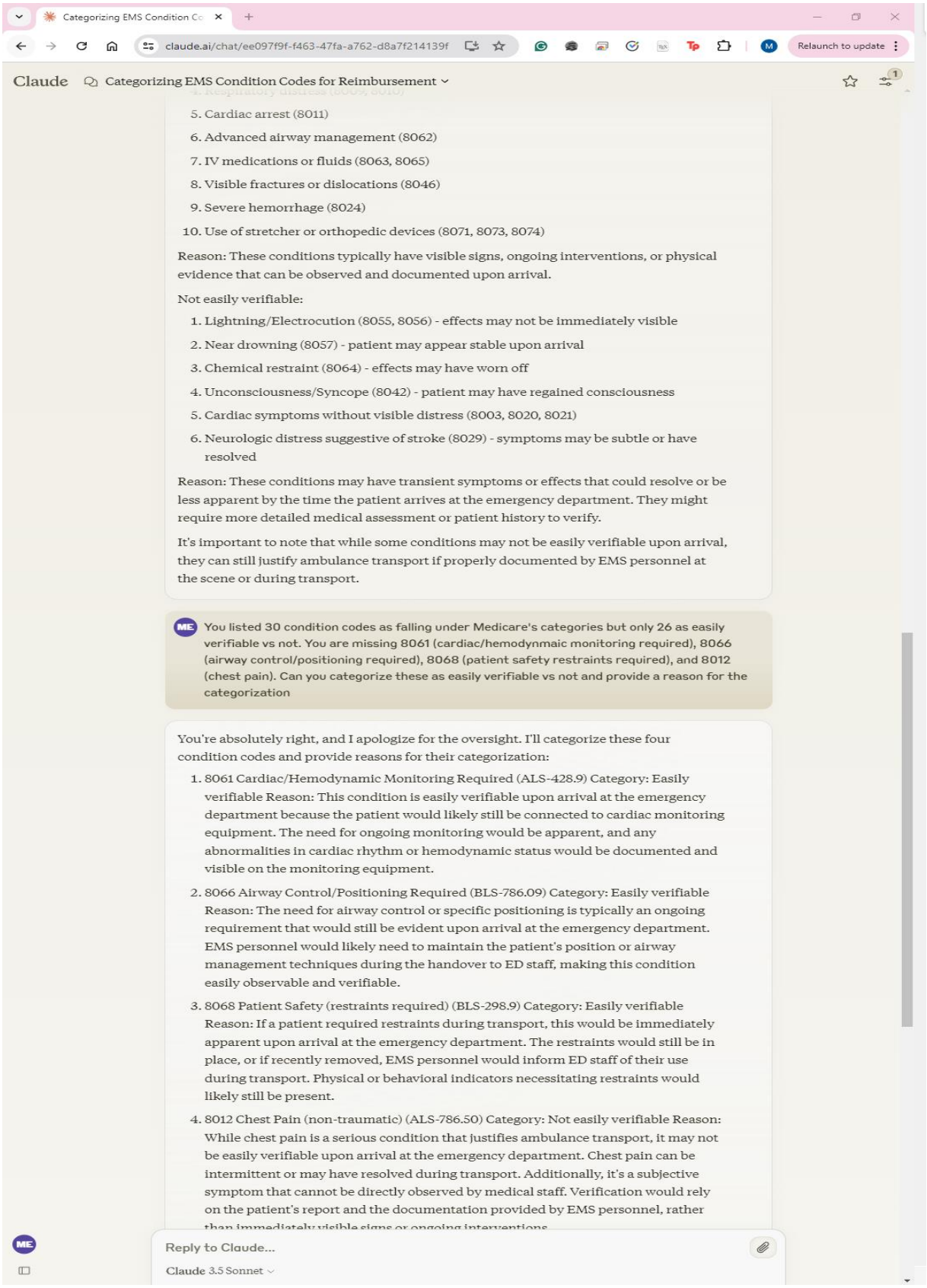
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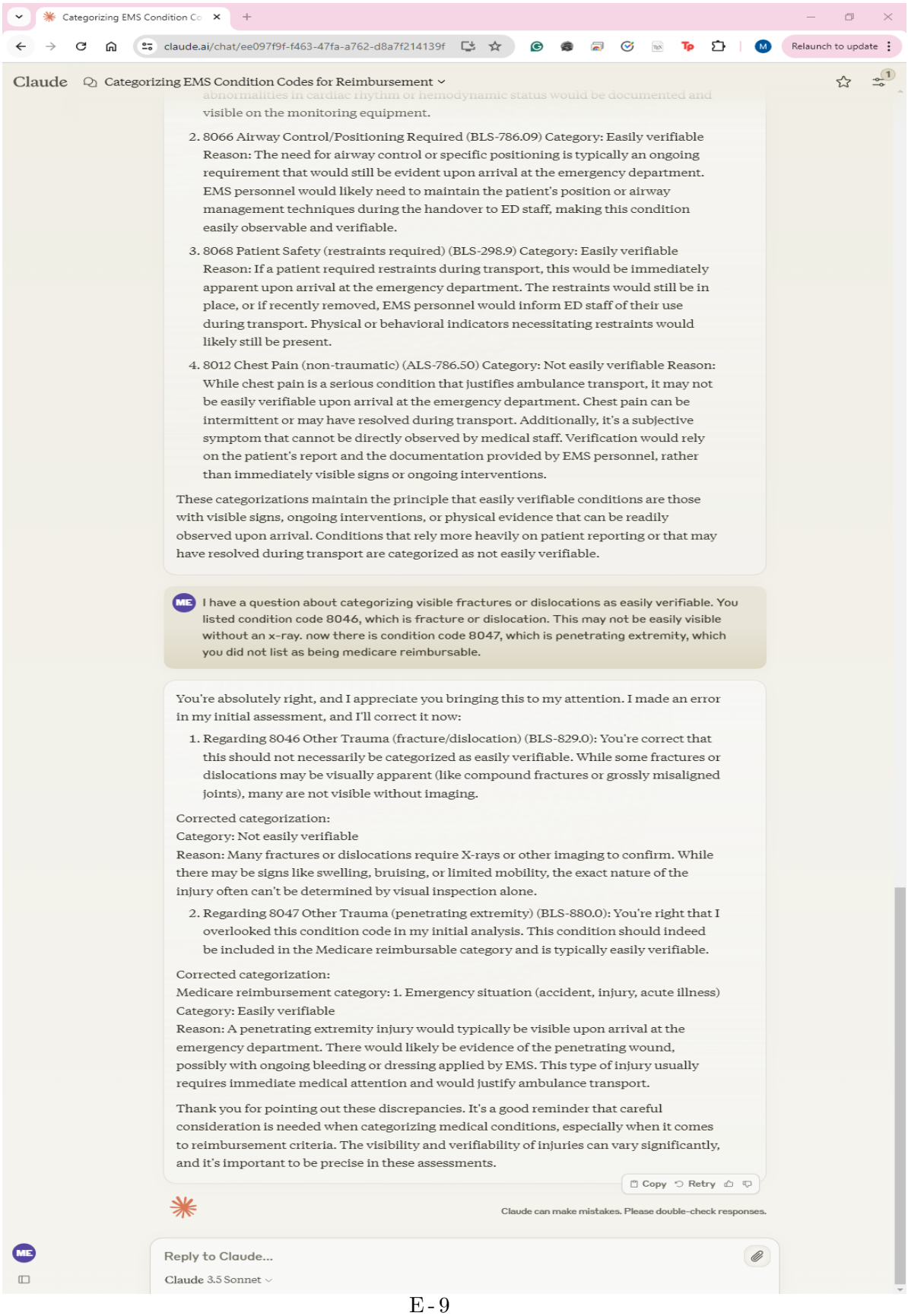
E.2 Claude Prompt and Responses:

Figure E2: AI Condition Code Selection: Claude Prompt and Responses


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ME
I am working on a research project that requires me to analyze condition codes of patients involved in an EMS encounter. However, I am not in the medical profession so I am looking for assistance in determining the proper labeling of condition codes. Specifically, I would like to flag condition codes that make transportation to a hospital by ambulance likely reimbursable by Medicare. CMS provides guidance on what will be reimbursable. It specifically lists (1) Transported in an emergency situation (i.e., result of accident, injury or acute illness); (2) Needed to be restrained to prevent injury to the beneficiary or others; (3) Was unconscious or in shock; (4) Required oxygen or other emergency treatment during transport to the nearest facility; (5) Exhibits signs and symptoms of acute respiratory distress or cardiac distress such as shortness of breath or chest pain; (6) Exhibits signs and symptoms that indicated the possibility of acute stroke; (7) had to remain immobile because of a fracture that had not been set or the possibility of a fracture; (8) Is experiencing severe hemorrhage; (9) could be moved only by stretcher; and (10) was bed-confined before and after the ambulance trip. I have uploaded a pdf that lists all of the possible condition codes. Can you go through this list and tell me explicitly which condition codes meet these 10 possible for being reimbursable? When you list the condition codes, please be specific about which reimbursable category they fall under. Not all condition codes will fall under reimbursable categories. Then go through and determine which condition codes that you've selected are easily verifiable when the patient arrives at the emergency department versus not. Be specific about why you made the categorization.
I'll go through the list of condition codes and categorize them based on the 10 criteria for Medicare reimbursement, then analyze which are easily verifiable upon arrival at the emergency department. Here's the breakdown:
1. Emergency situation (accident, injury, acute illness):


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Categorizing EMS Condition Codes for Reimbursement
1. Emergency situation (accident, injury, acute illness):
• 8043 Major Trauma (ALS-959.8)
• 8044 Other Trauma (need for monitor or airway) (ALS-518.5)
• 8045 Other Trauma (major bleeding) (ALS-958.2)
• 8049 Other Trauma (amputation other) (ALS-887.4)
• 8050 Other Trauma (suspected internal injuries) (ALS-869.0)
• 8051 Burns-Major (ALS-949.3)
• 8055 Lightning (ALS-994.0)
• 8056 Electrocution (ALS-994.8)
• 8057 Near Drowning (ALS-994.1)
2. Needed restraint:
• 8064 Chemical Restraint (ALS-293.0)
• 8068 Patient Safety (restraints required) (BLS-298.9)
3. Unconscious or in shock:
• 8042 Unconscious/Syncope/Dizziness (ALS-780.02)
4. Required oxygen or emergency treatment:
• 8009 Respiratory Arrest (ALS-799.1)
• 8010 Difficulty Breathing (ALS-786.05)
• 8011 Cardiac Arrest-Resuscitation in Progress (ALS-427.5)
• 8062 Advanced Airway Management (ALS-518.81)
• 8063 IV Meds Required (ALS-No ICD code provided)
• 8065 Suctioning/Oxygen/IV fluids required (BLS-496.0)
• 8066 Airway Control/Positioning Required (BLS-786.09)
5. Signs of acute respiratory or cardiac distress:
• 8003 Abnormal Cardiac Rhythm/Cardiac Dysrhythmia (ALS-427.9)
• 8012 Chest Pain (non-traumatic) (ALS-786.50)
• 8020 Cardiac Symptoms other than Chest Pain (palpitations) (ALS-785.1)
• 8021 Cardiac Symptoms other than Chest Pain (atypical pain) (ALS-536.2)
• 8061 Cardiac/Hemodynamic Monitoring Required (ALS-428.9)
6. Signs of acute stroke:
• 8029 Neurologic Distress (ALS-436.0)
7. Immobile due to fracture or possible fracture:
• 8046 Other Trauma (fracture/dislocation) (BLS-829.0)
8. Severe hemorrhage:
• 8024 Hemorrhage (ALS-459.0)
9. Could be moved only by stretcher:
• 8071 Patient Safety (risk of falling off stretcher) (BLS-781.3)
• 8073 Special Handling (orthopedic device required) (BLS-907.2)
• 8074 Special Handling (positioning required) (BLS-719.45)
10. Bed-confined before and after:
• None specifically listed in the provided codes.
Now, let's categorize these based on easy verifiability upon arrival at the emergency department:
Easily verifiable:
1. Major trauma (8043, 8044, 8045, 8049, 8050)
2. Burns (8051)
3. Amputations (8049)
4. Respiratory distress (8009, 8010)
5. Cardiac arrest (8011)
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5. Cardiac arrest (8011)
6. Advanced airway management (8062)
7. IV medications or fluids (8063, 8065)
8. Visible fractures or dislocations (8046)
9. Severe hemorrhage (8024)
10. Use of stretcher or orthopedic devices (8071, 8073, 8074)
Reason: These conditions typically have visible signs, ongoing interventions, or physical evidence that can be observed and documented upon arrival.
Not easily verifiable:
1. Lightning/Electrocution (8055, 8056) - effects may not be immediately visible
2. Near drowning (8057) - patient may appear stable upon arrival
3. Chemical restraint (8064) - effects may have worn off
4. Unconsciousness/Syncope (8042) - patient may have regained consciousness
5. Cardiac symptoms without visible distress (8003, 8020, 8021)
6. Neurologic distress suggestive of stroke (8029) - symptoms may be subtle or have resolved
Reason: These conditions may have transient symptoms or effects that could resolve or be less apparent by the time the patient arrives at the emergency department. They might require more detailed medical assessment or patient history to verify.
It's important to note that while some conditions may not be easily verifiable upon arrival, they can still justify ambulance transport if properly documented by EMS personnel at the scene or during transport.
ME
You listed 30 condition codes as falling under Medicare's categories but only 26 as easily verifiable vs not. You are missing 8061 (cardiac/hemodynmaic monitoring required), 8066 (airway control/positioning required), 8068 (patient safety restraints required), and 8012 (chest pain). Can you categorize these as easily verifiable vs not and provide a reason for the categorization
You're absolutely right, and I apologize for the oversight. I'll categorize these four condition codes and provide reasons for their categorization:
1. 8061 Cardiac/Hemodynamic Monitoring Required (ALS-428.9) Category: Easily verifiable Reason: This condition is easily verifiable upon arrival at the emergency department because the patient would likely still be connected to cardiac monitoring equipment. The need for ongoing monitoring would be apparent, and any abnormalities in cardiac rhythm or hemodynamic status would be documented and visible on the monitoring equipment.
2. 8066 Airway Control/Positioning Required (BLS-786.09) Category: Easily verifiable Reason: The need for airway control or specific positioning is typically an ongoing requirement that would still be evident upon arrival at the emergency department. EMS personnel would likely need to maintain the patient's position or airway management techniques during the handover to ED staff, making this condition easily observable and verifiable.
3. 8068 Patient Safety (restraints required) (BLS-298.9) Category: Easily verifiable Reason: If a patient required restraints during transport, this would be immediately apparent upon arrival at the emergency department. The restraints would still be in place, or if recently removed, EMS personnel would inform ED staff of their use during transport. Physical or behavioral indicators necessitating restraints would likely still be present.
4. 8012 Chest Pain (non-traumatic) (ALS-786.50) Category: Not easily verifiable Reason: While chest pain is a serious condition that justifies ambulance transport, it may not be easily verifiable upon arrival at the emergency department. Chest pain can be intermittent or may have resolved during transport. Additionally, it's a subjective symptom that cannot be directly observed by medical staff. Verification would rely on the patient's report and the documentation provided by EMS personnel, rather
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Categorizing EMS Condition Codes for Reimbursement
abnormalities in cardiac rhythm or hemodynamic status would be documented and visible on the monitoring equipment.
2. 8066 Airway Control/Positioning Required (BLS-786.09) Category: Easily verifiable Reason: The need for airway control or specific positioning is typically an ongoing requirement that would still be evident upon arrival at the emergency department. EMS personnel would likely need to maintain the patient's position or airway management techniques during the handover to ED staff, making this condition easily observable and verifiable.
3. 8068 Patient Safety (restraints required) (BLS-298.9) Category: Easily verifiable Reason: If a patient required restraints during transport, this would be immediately apparent upon arrival at the emergency department. The restraints would still be in place, or if recently removed, EMS personnel would inform ED staff of their use during transport. Physical or behavioral indicators necessitating restraints would likely still be present.
4. 8012 Chest Pain (non-traumatic) (ALS-786.50) Category: Not easily verifiable Reason: While chest pain is a serious condition that justifies ambulance transport, it may not be easily verifiable upon arrival at the emergency department. Chest pain can be intermittent or may have resolved during transport. Additionally, it's a subjective symptom that cannot be directly observed by medical staff. Verification would rely on the patient's report and the documentation provided by EMS personnel, rather than immediately visible signs or ongoing interventions.
These categorizations maintain the principle that easily verifiable conditions are those with visible signs, ongoing interventions, or physical evidence that can be readily observed upon arrival. Conditions that rely more heavily on patient reporting or that may have resolved during transport are categorized as not easily verifiable.
ME
I have a question about categorizing visible fractures or dislocations as easily verifiable. You listed condition code 8046, which is fracture or dislocation. This may not be easily visible without an x-ray. now there is condition code 8047, which is penetrating extremity, which you did not list as being medicare reimbursable.
You're absolutely right, and I appreciate you bringing this to my attention. I made an error in my initial assessment, and I'll correct it now:
1. Regarding 8046 Other Trauma (fracture/dislocation) (BLS-829.0): You're correct that this should not necessarily be categorized as easily verifiable. While some fractures or dislocations may be visually apparent (like compound fractures or grossly misaligned joints), many are not visible without imaging.
Corrected categorization:
Category: Not easily verifiable
Reason: Many fractures or dislocations require X-rays or other imaging to confirm. While there may be signs like swelling, bruising, or limited mobility, the exact nature of the injury often can't be determined by visual inspection alone.
2. Regarding 8047 Other Trauma (penetrating extremity) (BLS-880.0): You're right that I overlooked this condition code in my initial analysis. This condition should indeed be included in the Medicare reimbursable category and is typically easily verifiable.
Corrected categorization:
Medicare reimbursement category: 1. Emergency situation (accident, injury, acute illness)
Category: Easily verifiable
Reason: A penetrating extremity injury would typically be visible upon arrival at the emergency department. There would likely be evidence of the penetrating wound, possibly with ongoing bleeding or dressing applied by EMS. This type of injury usually requires immediate medical attention and would justify ambulance transport.
Thank you for pointing out these discrepancies. It's a good reminder that careful consideration is needed when categorizing medical conditions, especially when it comes to reimbursement criteria. The visibility and verifiability of injuries can vary significantly, and it's important to be precise in these assessments.
Copy
Retry
Claude can make mistakes. Please double-check responses.
ME
Reply to Claude...
Claude 3.5 Sonnet

Online Appendix F UnitedHealthcare Ambulance Coverage Guidelines: 2014

Figure F1: UnitedHealthcare Coverage Determination Guideline: Ambulance Services (2014)

AMBULANCE SERVICES

Guideline Number: CDG.001.02
Effective Date: June 1, 2014

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COVERAGE RATIONALE	1	None
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INSTRUCTIONS FOR USE

This Coverage Determination Guideline provides assistance in interpreting certain standard UnitedHealthcare benefit plans. When deciding coverage, the enrollee specific document must be referenced. The terms of an enrollee's document (e.g., Certificates of Coverage (COCs), Schedules of Benefits (SOBs), or Summary Plan Descriptions (SPDs), and Medicaid State Contracts) may differ greatly from the standard benefit plans upon which this guideline is based. In the event of a conflict, the enrollee's specific benefit document supersedes these guidelines. All reviewers must first identify enrollee eligibility, any federal or state regulatory requirements and the plan benefit coverage prior to use of this guideline. Other coverage determination guidelines and medical policies may apply. UnitedHealthcare reserves the right, in its sole discretion, to modify its coverage determination guidelines and medical policies as necessary. This Coverage Determination Guideline does not constitute medical advice.

UnitedHealthcare may also use tools developed by third parties, such as the MCG™ Care Guidelines, to assist us in administering health benefits. The MCG™ Care Guidelines are intended to be used in connection with the independent professional medical judgment of a qualified health care provider and do not constitute the practice of medicine or medical advice.

COVERAGE RATIONALE

Plan Document Language

Before using this guideline, please check enrollee's specific plan document and any federal or state mandates, if applicable.

Essential Health Benefits for Individual and Small Group:
For plan years beginning on or after January 1, 2014, the Affordable Care Act of 2010 (ACA) requires fully insured non-grandfathered individual and small group plans (inside and outside of Exchanges) to provide coverage for ten categories of Essential Health Benefits ("EHBs"). Large group plans (both self-funded and fully insured), and small group ASO plans, are not subject to the requirement to offer coverage for EHBs. However, if such plans choose to provide coverage for benefits which are deemed EHBs (such as maternity benefits), the ACA requires all dollar limits on those benefits to be removed on all Grandfathered and Non-Grandfathered plans. The determination of which benefits constitute EHBs is made on a state by state basis. As such, when using this guideline, it is important to refer to the enrollee's specific plan document to determine benefit coverage.

Indications for Coverage

Emergency Ambulance (Ground, Water, or Air):

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Coverage includes emergency ambulance transportation (including wait time and treatment at the scene) by a licensed ambulance service from the location of the sudden illness or injury, to the nearest hospital where emergency health services can be performed.

The following emergency ambulance services are covered:

1. Ground ambulance or air ambulance transportation requiring basic life support or advanced life support.
2. Treatment at the scene (paramedic services) without ambulance transportation.
3. Wait time associated with covered ambulance transportation.
4. To a hospital that provides a required higher level of care that was not available at the original hospital.

Air Ambulance:
As a general guideline, when it would take a ground ambulance 30-60 minutes or more to transport an enrollee whose medical condition at the time of pick-up required immediate and rapid transport due to the nature and/or severity of the enrollee's illness/injury, air transportation may be appropriate.

Air ambulance transportation should meet the following criteria:

1. The patient's destination is an acute care hospital, **and**
2. The patient's condition is such that the ground ambulance (basic or advanced life support) would endanger the enrollee's life or health, **or**
3. Inaccessibility to ground ambulance transport or extended length of time required to transport the patient via ground ambulance transportation could endanger the enrollee, **or**
4. Weather or traffic conditions make ground ambulance transportation impractical, impossible, or overly time consuming.

Refer to #4 (Medicare Benefit Policy Manual) in the References section below.

Enrollee pre-service notification/prior authorization is not required for emergency ambulance services.

Additional Information:

- For covered emergency ambulance, supplies that are needed for advanced life support or basic life support to stabilize a patient's medical condition are covered under the ambulance benefit.

Non-Emergency Ambulance (Ground or Air) Between Facilities:
Coverage includes non-emergency ambulance transportation by a licensed ambulance service (either ground or air ambulance), between health care facilities when the ambulance transportation is any of the following:

1. From a non-network hospital to a network hospital
2. To a hospital that provides a required higher level of care that was not available at the original hospital
3. To a more cost-effective acute care facility
4. From an acute facility to a sub-acute setting.

Cost Effective Alternatives (UHIC 2007 COC and 2009 Amendment):
If an alternate method of ambulance transportation is clinically appropriate and more cost effective, we reserve the right to adjust the amount of eligible expenses. As we determine to be appropriate, the coverage determination is based on the enrollee's medical condition, and geographic location.

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Medically Necessary (UHIC 2011 COC):
Non-emergency ambulance transportation is medically necessary when the patient's condition requires treatment at another facility and when another mode of transportation would endanger the patient's medical condition. If another mode of transportation could be used safely and effectively, then ambulance transportation is not medically necessary.

Benefit Level for Non-Emergency Ambulance:
The applicable benefit for eligible non-emergency ambulance transportation depends on the patient pick-up location (origin) as follows:

1. *If the patient is inpatient and is transported from a hospital to another hospital or inpatient facility*, coverage levels for these ambulance services may vary. Please refer to the enrollee's specific plan document to determine benefits. The following are UHIC examples for inpatient ambulance transfer:
    a. UHIC 2001 COC: The *Hospital Inpatient Stay* section of the COC
    b. UHIC 2007 and 2011 COC: the *Ambulance Services* section of the COC
2. *If the patient is in a sub-acute setting and is transported to an outpatient facility and back* (outpatient hospital, outpatient facility, or physician's office), these ambulance services are covered under the benefits that apply to that sub-acute setting. For example, if the patient is at a Skilled Nursing Facility, the ambulance transport to an outpatient facility (dialysis facility, or radiation whether or not it is attached to a hospital) and back is covered under the Skilled Nursing Facility/Inpatient Rehabilitation Facility Services section of the COC.

Enrollee Pre-Service Notification Requirements for Non-Emergency Ambulance:

- If UHIC initiates the non-emergency ambulance transportation, enrollee notification is not required.
- If UHIC does **not** initiate the non-emergency ambulance transportation certain plans may require the enrollee or the provider to call in for notification. Please see the enrollee-specific plan documents for details on the notification requirements.

Additional Information:

- Provider notification requirements are not addressed by this document.
- Ambulance transportation that is done for convenience of the patient is not covered. Please see the Coverage Limitations and Exclusions section below for more information on non-covered ambulance transportation.

Benefit Level for Non-Network Ambulance (Emergency):
If the ambulance transportation is covered, non-network emergency ambulance (ground, water, or air), is covered at the network level of deductible and coinsurance.

Additional Information:

- For UHIC Choice, Choice+, and Options PPO plans: Non-network emergency ambulance is covered at a negotiated rate, or, at billed charges if a negotiated rate is not reached.
- For UHIC Non-Differential PPO plans: The benefits for network and non-network are the same level but these plans do not require billed charges to be paid on non-network ambulance.
- For UHIC Plans Without a Network (eg, Managed Indemnity): These plans do not have network benefit levels. These plans do not require billed charges to be paid on ambulance services.

Coverage Limitations and Exclusions

The following services are not eligible for coverage:

1. Ambulance services from providers that are not properly licensed to be performing the ambulance services rendered.

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2. Air ambulance that does not meet the covered indications in the Air Ambulance criteria listed above.
3. Non-ambulance transportation. Non-ambulance transportation is not covered even if rendered in an emergency situation. Examples include but are not limited to commercial or private airline or helicopter, a police car ride to a hospital, medi-van transportation, wheel-chair van, taxi ride, bus ride, etc.
4. Ambulance transportation when other mode of transportation is appropriate. Except as indicated under the Indications for Coverage section of this policy, ambulance services when transportation by other means would not endanger the enrollee's health, are not covered.
5. Ambulance transportation to a home, residential, domiciliary or custodial facility is not covered.
6. Ambulance transportation that violates the notification criteria listed in the Indications for Coverage section above.
7. Ambulance transportation for patient convenience or other miscellaneous reasons for patient and/or family. Examples include but are not limited to:
    a. Patient wants to be at a certain hospital or facility for personal/preference reasons;
    b. Patient is in foreign country, or out of state, wants to come home to for a surgical procedure or treatment (this includes those recently discharged from inpatient care);
    c. Patient is going to a routine service and is medically able to use another mode of transportation but can't find it;
    d. Patient is deceased (ie, transportation to the coroner's office or mortuary)
8. Ambulance transportation deemed not appropriate. Examples include but are not limited to:
    a. Hospital to home
    b. Home to physician's office
    c. Home (eg. residence, nursing home, domiciliary or custodial facility) to a hospital for a scheduled service

Additional Information:

- If the patient is at a Skilled Nursing Facility/Inpatient Rehabilitation Facility and has met the annual day/visit limit on Skilled Nursing Facility/Inpatient Rehabilitation Facility Services, ambulance transports (during the non-covered days) are not eligible.

DEFINITIONS

Emergency - A serious medical condition or symptom resulting from Injury, Sickness or [[1]Mental Illness][[2]mental illness] which is both of the following:

- Arises suddenly
- In the judgment of a reasonable person, requires immediate care and treatment, generally received within 24 hours of onset, to avoid jeopardy to life or health

Medically Necessary (UHIC 2011 COC) - health care services provided for the purpose of preventing, evaluating, diagnosing or treating a Sickness, Injury, [Mental Illness,] [mental illness,] substance use disorder, condition, disease or its symptoms, that are all of the following as determined by us or our designee, within our sole discretion.

- In accordance with Generally Accepted Standards of Medical Practice

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- Clinically appropriate, in terms of type, frequency, extent, site and duration, and considered effective for your Sickness, Injury, [Mental Illness,] [mental illness,] substance use disorder, disease or its symptoms
- Not mainly for your convenience or that of your doctor or other health care providerNot more costly than an alternative drug, service(s) or supply that is at least as likely to produce equivalent therapeutic or diagnostic results as to the diagnosis or treatment of your Sickness, Injury, disease or symptoms

Generally Accepted Standards of Medical Practice are standards that are based on credible scientific evidence published in peer-reviewed medical literature generally recognized by the relevant medical community, relying primarily on controlled clinical trials, or, if not available, observational studies from more than one institution that suggest a causal relationship between the service or treatment and health outcomes.

If no credible scientific evidence is available, then standards that are based on Physician specialty society recommendations or professional standards of care may be considered. We reserve the right to consult expert opinion in determining whether health care services are Medically Necessary. The decision to apply Physician specialty society recommendations, the choice of expert and the determination of when to use any such expert opinion, shall be within our sole discretion.

We develop and maintain clinical policies that describe the *Generally Accepted Standards of Medical Practice* scientific evidence, prevailing medical standards and clinical guidelines supporting our determinations regarding specific services. These clinical policies (as developed by us and revised from time to time), are available to Covered Persons on [myuhc.com] or by calling *Customer Care* at the telephone number on your ID card, and to Physicians and other health care professionals on UnitedHealthcareOnline.

APPLICABLE CODES

The Current Procedural Terminology (CPT®) and Healthcare Common Procedure Coding System (HCPCS) codes listed in this guideline are for reference purposes only. Listing of a service code in this guideline does not imply that the service described by this code is a covered or non-covered health service. Coverage is determined by the enrollee specific benefit document and applicable laws that may require coverage for a specific service. The inclusion of a code does not imply any right to reimbursement or guarantee claims payment. Other policies and coverage determination guidelines may apply.

CPT® is a registered trademark of the American Medical Association.

Ambulance claims are billed with the following modifiers. The first digit indicates the place of origin, and the destination is indicated by the second digit. The modifiers most commonly used are:

D - Diagnostic or therapeutic site other than 'P' or 'H'
E - Residential, domiciliary, custodial facility (nursing home, not skilled nursing facility)
G - Hospital-based dialysis facility (hospital or hospital-related)
H - Hospital
I - Site of transfer (for example, airport or helicopter pad) between types of ambulance
J - Non-hospital-based dialysis facility
N - Skilled nursing facility (SNF)
P - Physician's office (includes HMO non-hospital facility, clinic, etc.)
R - Residence
S - Scene of accident or acute event
X - Intermediate stop at physician's office en route to the hospital (includes HMO non-hospital facility, clinic, etc.)

Note: Modifier X can only be used as a destination code in the second position of a modifier

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Limited to specific procedure codes?	☐ YES ☒ NO

Codes Specific to Air Ambulance	
HCPCS Procedure Code	**Description**
A0430	Ambulance service, conventional air service, transport, one way (fixed wing)
A0431	Ambulance service, conventional air services, transport, one way (rotary wing)
A0435	Fixed wing air mileage, per statute mile
A0436	Rotary wing air mileage, per statute mile
S9960	Ambulance service, conventional air services, nonemergency transport, one way (fixed wing)
S9961	Ambulance service, conventional air service, nonemergency transport, one way (rotary wing)
T2007	Transportation waiting time, air ambulance and non-emergency vehicle, one-half (1/2) hour increments

Also see Air Ambulance Revenue Code 545 below.

Ground/Other Ambulance Codes	
HCPCS Procedure Code	**Description**
A0225	Ambulance service, neonatal transport, base rate, emergency transport, one way
A0380	BLS mileage (per mile)
A0382	BLS routine disposable supplies
A0384	BLS specialized service disposable supplies; defibrillation (used by ALS ambulances and BLS ambulances in jurisdictions where defibrillation is permitted in BLS ambulances)
A0390	ALS miles (per mile)
A0392	ALS specialized service disposable supplies; defibrillation (to be used only in jurisdictions where defibrillation cannot be performed by BLS ambulances)
A0394	ALS specialized service disposable supplies; IV drug
A0396	ALS specialized service disposable supplies; esophageal intubation
A0398	ALS routine disposable supplies
A0420	Ambulance waiting time (ALS or BLS), one-half (1/2) hour increments
A0422	Ambulance (ALS or BLS) oxygen and oxygen supplies, life sustaining situation
A0424	Extra ambulance attendant, ground (ALS or BLS) or air (fixed or rotary winged); (requires medical review)
A0425	Ground mileage, per statuTe mile
A0426	Ambulance service, advanced life support, non-emergency transport, level 1 (ALS 1)
A0427	Ambulance service, advanced life support, emergency transport, level 1 (ALS 1-emergency)
A0428	Ambulance service, basic life support, non-emergency transport (BLS)
A0429	Ambulance service, basic life support, emergency transport (BLS-emergency)
A0432	Paramedic intercept (PI), rural area, transport furnished by a volunteer

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Ground/Other Ambulance Codes	
HCPCS Procedure Code	**Description**
	ambulance company which is prohibited by state law from billing third party payers
A0433	Advanced life support, level 2 (ALS 2)
A0434	Specialty care transport (SCT)
A0998	Ambulance response and treatment, no transport
A0999	Unlisted ambulance service
S0207	Paramedic intercept, non-hospital based ALS, non-transport
S0208	Paramedic intercept, hospital based ALS, non-transport

Limited to specific diagnosis codes?	☐ YES ☒ NO

Limited to place of service (POS)?	☐ YES ☒ NO

Limited to specific provider type?	☒ YES ☐ NO
	• Ambulance • Hospital

Limited to specific revenue codes?	☐ YES ☒ NO
540	Ambulance; General Classification
541	Ambulance; Supplies
542	Ambulance; Medical Transport
543	Ambulance; Heart Mobile
544	Ambulance; Oxygen
545	Air Ambulance
546	Neo-natal Ambulance
547	Ambulance; Pharmacy
548	Ambulance; Telephone Transmission EKG
549	Other Ambulance

REFERENCES

1. Medicare Benefit Policy Manual, Chapter 10 – Ambulance Services, last accessed March 2012: http://www.cms.gov/manuals/Downloads/bp102c10.pdf

GUIDELINE HISTORY/REVISION INFORMATION

Date	Action/Description
06/12/2014	• Added benefit considerations language for *Essential Health Benefits for Individual and Small Group* plans (removed from 6/1/14 policy version in error)
06/01/2014	• Revised coverage rationale: o Updated *enrollee pre-service notification requirements for non-emergency ambulance*; replaced certificate of coverage (COC) specific information with reference to the enrollee-specific plan documents for details on applicable notification requirements o Removed benefit considerations language specific to ASO plans

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Date	Action/Description
	• Updated list of applicable CPT codes; removed language pertaining to coding of origin and destination modifiers on form CMS-1491 • Archived previous policy version CDG.001.01

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