Payer Mix Analysis: Autoimmune Encephalitis (AIE) and Myelin Oligodendrocyte Glycoprotein Antibody-associated Disease (MOG-AD)

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Commissioned by UCB, Inc.

JANUARY 2023

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The information is intended to summarize results of our autoimmune encephalitis (AIE) and Myelin oligodendrocyte glycoprotein antibody-associated disease (MOG-AD) payer mix analysis. It is not intended, and should not be used, for any other purpose.

This analysis is subject to the limitations inherent in analysis of claims data (e.g., the potential for mis- or under-coding of diagnosis). In preparing this information, we relied on internal claims datasets and data from Kaiser Family Foundation. We accepted this information without audit but reviewed the information for general reasonableness. Our results and conclusions may not be appropriate if this information is not accurate.

This information is subject to the consulting services agreement between Milliman and UCB, effective October 12, 2016.

Jake Klaisner and Jessica Naber are actuaries for Milliman, members of the American Academy of Actuaries, and meet the Qualification Standards of the Academy to render the actuarial opinion contained herein. To the best of their knowledge and belief, this information is complete and accurate and has been prepared in accordance with generally recognized and accepted actuarial principles and practices.

Background

- UCB, Inc (UCB) engaged Milliman to estimate the distribution of patients with autoimmune encephalitis (AIE) or myelin oligodendrocyte glycoprotein antibody-associated disease (MOG-AD) among the following payer channels:
  - Medicare Fee-for-Service (FFS)
  - Medicare Advantage
  - Commercial
  - Medicaid (FFS and managed care)
- Milliman conducted a claims-based analysis for AIE, as well as a literature-based analysis for AIE and MOG-AD. Please see slide 16 and 17 for a full description of the methodology underlying the literature-based analysis and claims-based analysis, respectively.
- MOG-AD is a disorder caused by inflammatory attacks of the central nervous system. Symptoms of MOG-AD include impacts to vision, loss of motor function in the limbs, loss of bladder or bowel control, and / or seizures.
- AIE is a group of autoimmune disorders that affect the brain and cause inflammation of the brain. AIE can cause neurological and / or psychiatric symptoms including impaired memory, problems with movement, speech and / or vision, psychosis, aggression, panic attacks, among others.

https://rarediseases.org/rare-diseases/mog-antibody-disease/
https://rarediseases.info.nih.gov/diseases/11979/autoimmune-encephalitis

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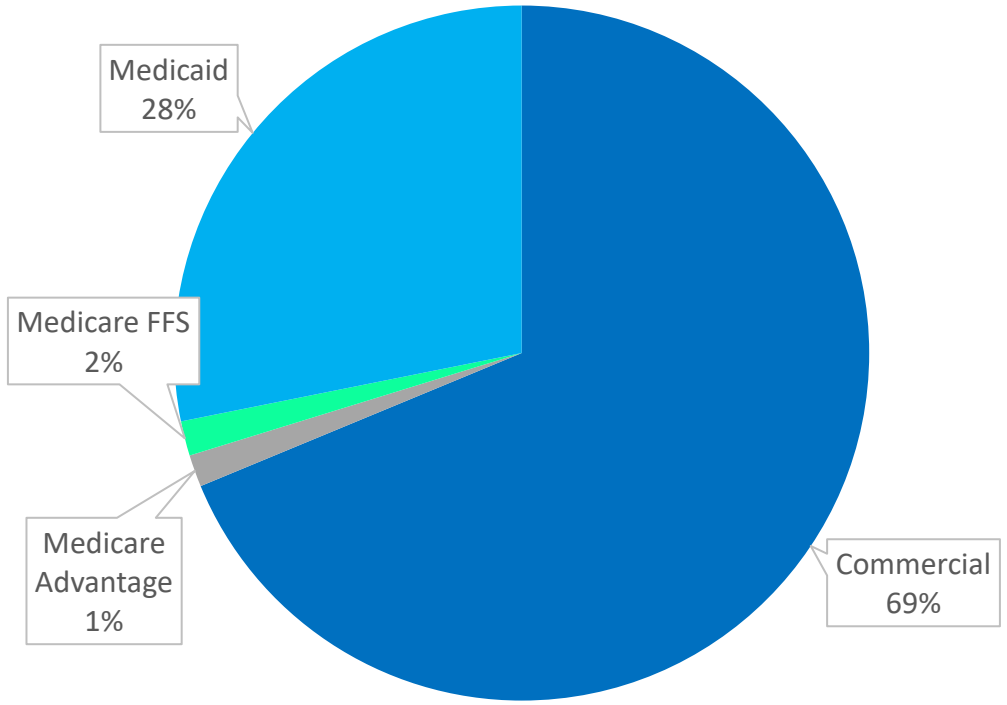
Literature-based Analysis: Myelin Oligodendrocyte Glycoprotein Antibody-associated Disease

MOG-AD Patient Payer Channel Distribution

Overall Assumed Prevalence per 100,000: 2.3



	Commercial	Medicare Advantage*	Medicare FFS*	Medicaid	Total
Distribution	69%	1%	2%	28%	100%
Total Population	5,213	113	122	2,139	7,588

Payer channel distribution estimates are based on the prevalent population using age and sex of the affected population in combination with the known enrollment and demographic characteristics of members enrolled in each payer channel.

**The age and sex distributions do not account for the potential to qualify for Medicare as the result of a disability for patients attributable to the Commercial population. In particular, patients may develop vision loss with visual acuity of 20/200 or worse, although more than 85% of these patients recover.*

See Appendix for sources used in developing these estimates.

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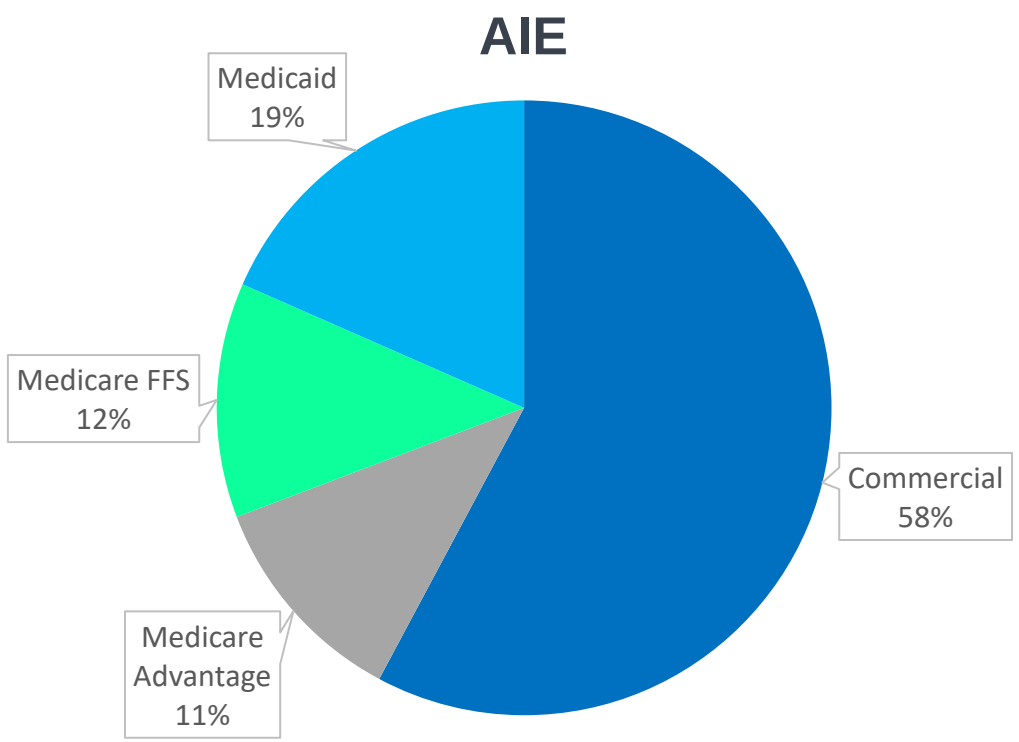
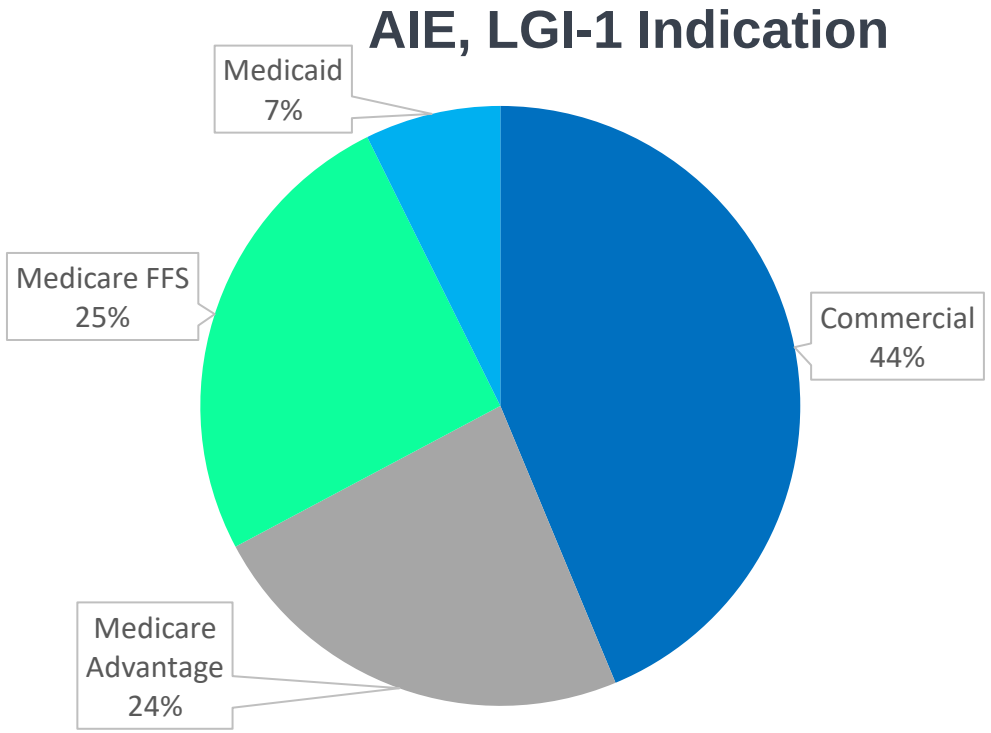
Literature-based Analysis: Autoimmune Encephalitis

AIE Patient Payer Channel Distribution

Overall Assumed AIE Prevalence per 100,000: 13.7

Overall Assumed LGI-1 Prevalence per 100,000: 2.2





Payer channel distribution based on the prevalent population using age, sex and race of the affected population in combination with the known enrollment and demographic characteristics of members enrolled in each payer channel. Medicare Advantage and Medicare FFS breakouts are based on known enrollment distributions. The age, sex, and race distributions do not account for the potential to qualify for Medicare as the result of a disability for patients attributable to the Commercial population.

See Appendix for sources used in developing these estimates.

AIE Patient Payer Channel

Overall Assumed AIE Prevalence per 100,000: 13.7

Overall Assumed LGI-1 Prevalence per 100,000: 2.2

	Commercial	Medicare Advantage	Medicare FFS	Medicaid	Total
			AIE		
Distribution	58%	11%	12%	19%	100%
Patient Population	25,596	5,052	5,473	8,154	44,275
			AIE, LGI-1		
Distribution	44%	24%	25%	7%	100%
Patient Population	3,130	1,682	1,822	524	7,158

See Appendix for sources used in developing these estimates.

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Claims-based Analysis: Autoimmune Encephalitis

Claims-based Observed AIE Prevalence per 100,000

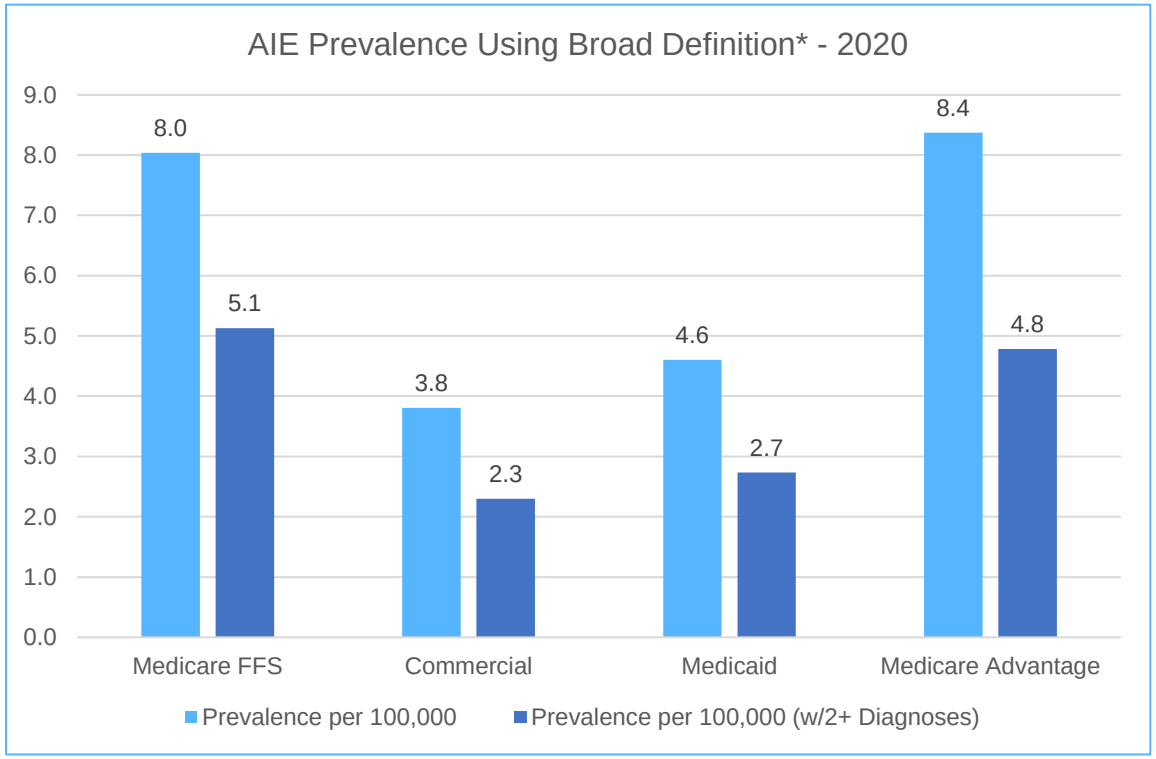
	All Members		Members with 2+ Diagnoses	
	All Payer Channels			
	2019	2020	2019	2020
Broad AIE (G04.81)*	4.8	4.8	2.8	2.9
AIE with Clinical Trial Exclusions**	1.9	1.9	1.0	1.0

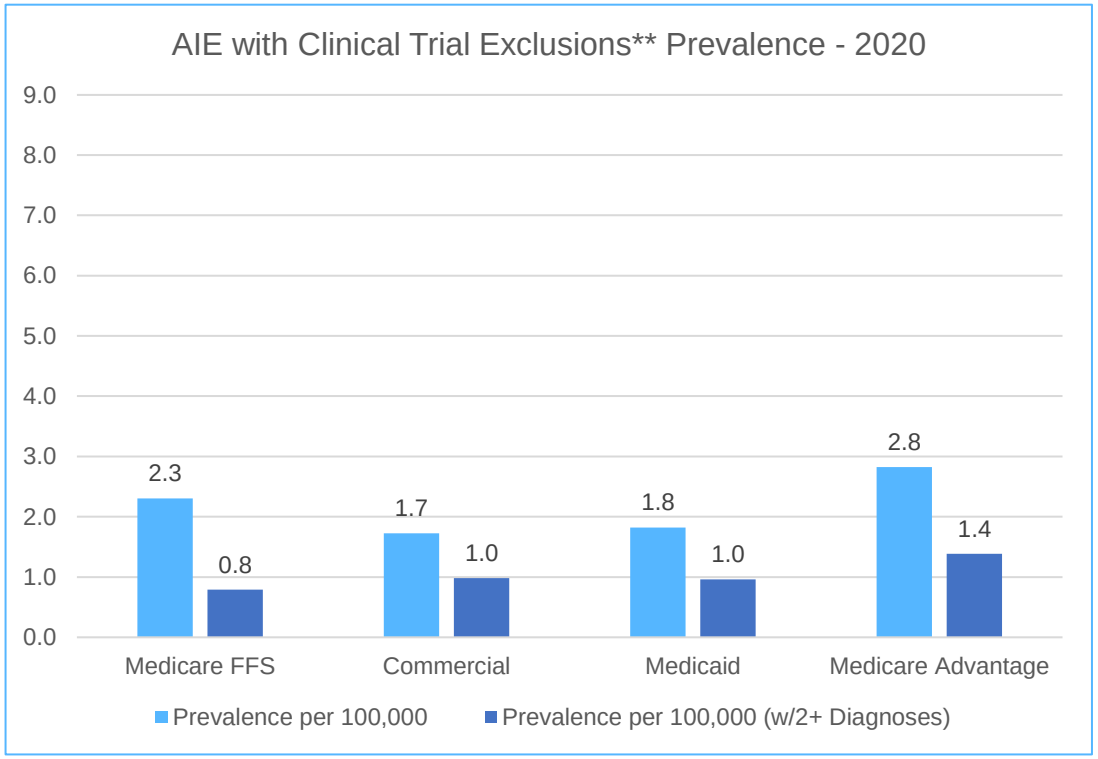
**Diagnosis code G04.81 includes multiple types of AIE and is not limited to LGI-1 AIE.*

***Exclusions include chronic infections (Hepatitis B, Hepatitis C, HIV, Tuberculosis), liver disease, certain gastrointestinal disorders, cancer, epilepsy, transplant, splenectomy, renal impairment, primary immunodeficiency, and biliary disease, consistent with UCB rozanolixizumab clinical trial exclusions.*

Sources: Milliman Internal Data Jan 2019 through Dec 2020, Medicare FFS 5% Sample Jan 2019 through Dec 2020, KFF 2021 Health Insurance Coverage of the Total Population.

Observed AIE Prevalence per 100,000 by Channel





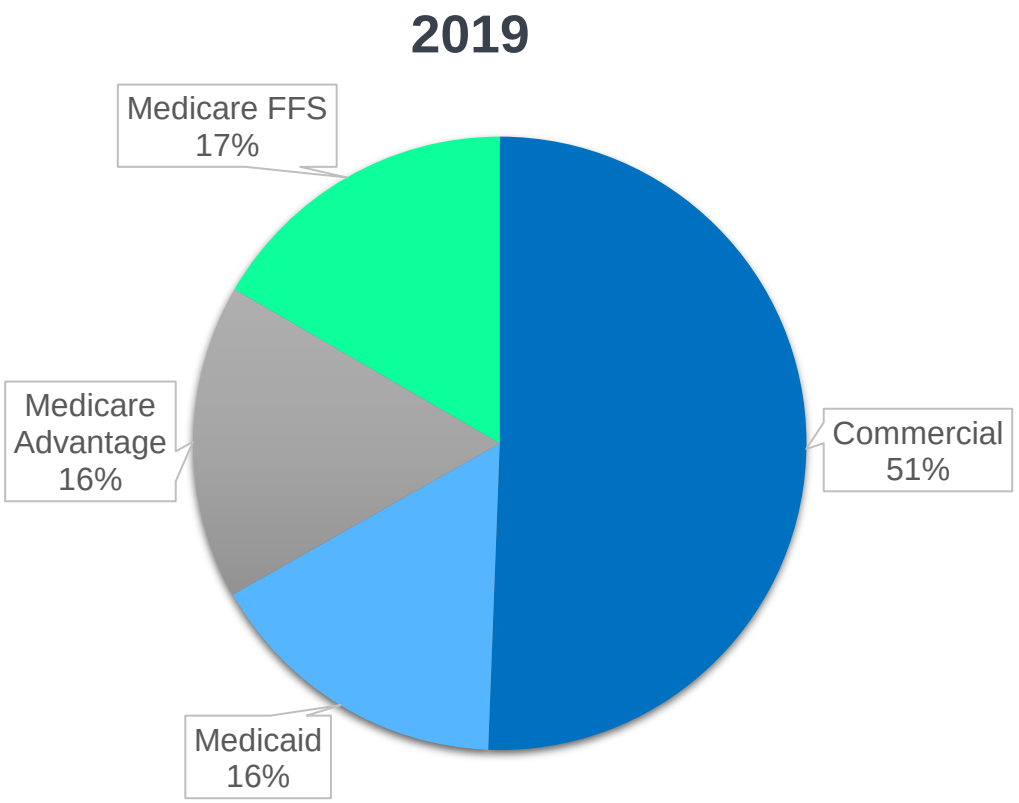
**Diagnosis code G04.81 includes multiple types of AIE and is not limited to LGI-1 AIE.*

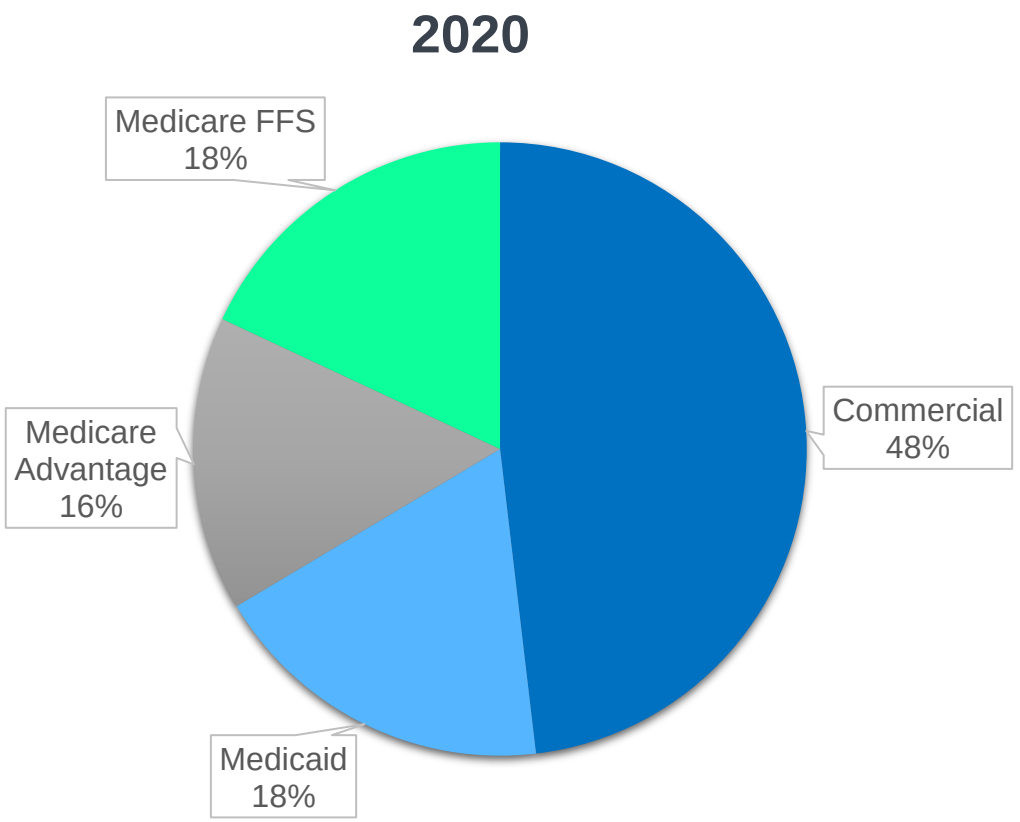
***Exclusions include chronic infections (Hepatitis B, Hepatitis C, HIV, Tuberculosis), liver disease, certain gastrointestinal disorders, cancer, epilepsy, transplant, splenectomy, renal impairment, primary immunodeficiency, and biliary disease, consistent with UCB rozanolixizumab clinical trial exclusions.*

Sources: Milliman Internal Data Jan 2019 through Dec 2020, Medicare FFS 5% Sample Jan 2019 through Dec 2020, KFF 2021 Health Insurance Coverage of the Total Population.

AIE Patient Payer Channel Distribution

Broad Definition of AIE,* Members with 2+ diagnoses



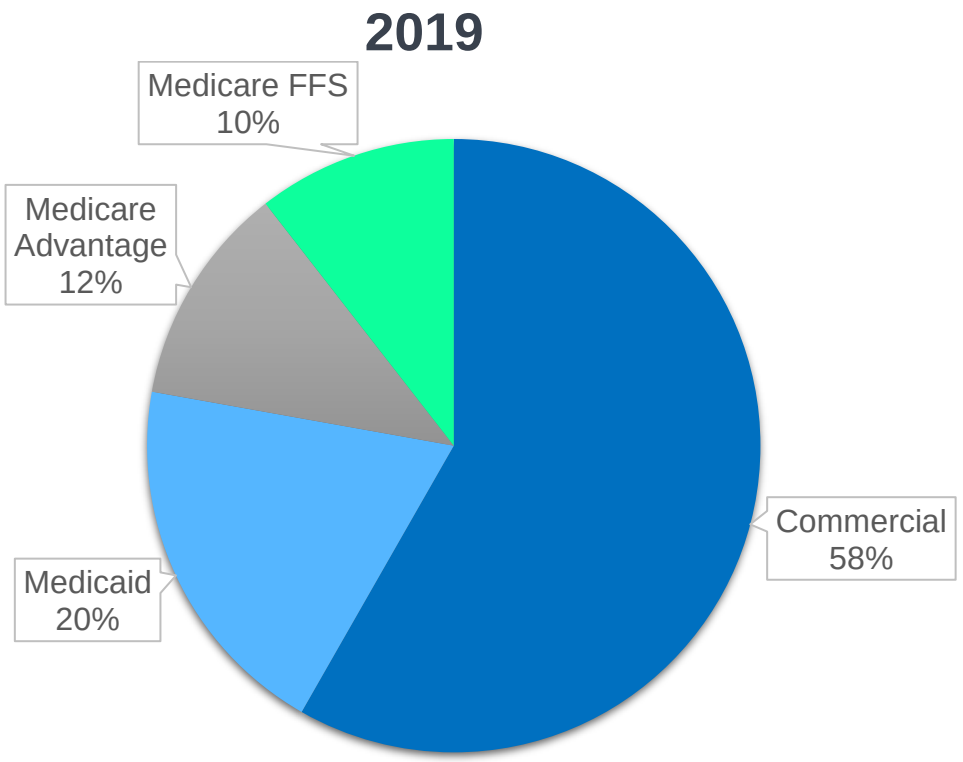


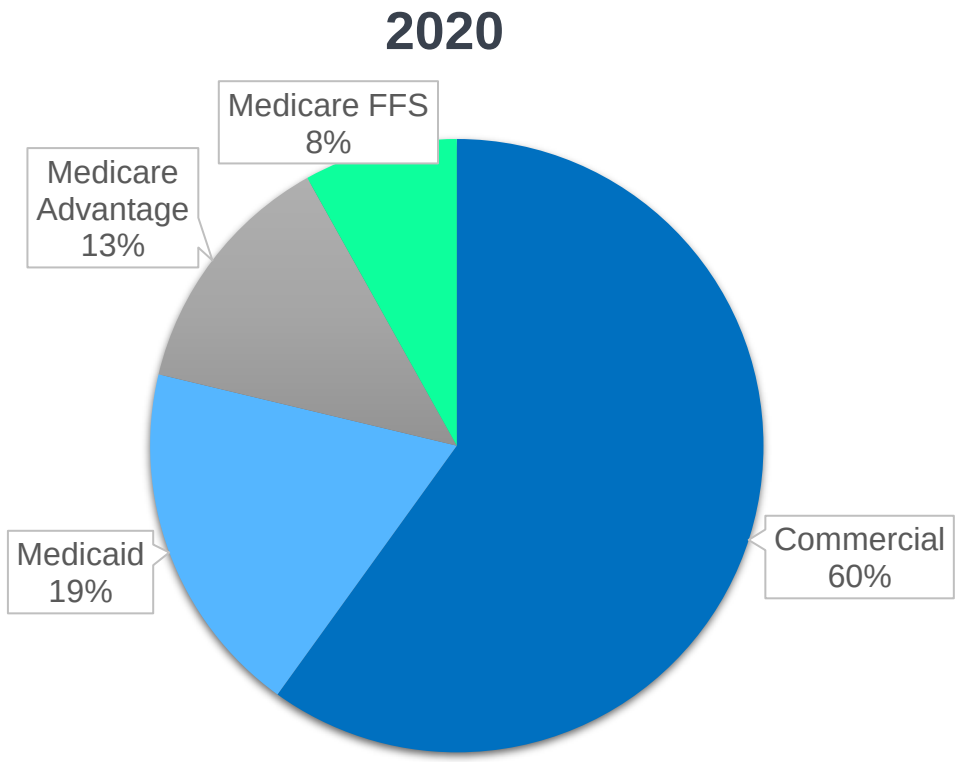
**Diagnosis code G04.81 includes multiple types of AIE and is not limited to LGI-1 AIE.*

Sources: Milliman Internal Data Jan 2019 through Dec 2020, Medicare FFS 5% Sample Jan 2019 through Dec 2020, KFF 2021 Health Insurance Coverage of the Total Population.

AIE Patient Payer Channel Distribution

AIE with Clinical Trial Exclusions,* Members with 2+ diagnoses





**Exclusions include chronic infections (Hepatitis B, Hepatitis C, HIV, Tuberculosis), liver disease, certain gastrointestinal disorders, cancer, epilepsy, transplant, splenectomy, renal impairment, primary immunodeficiency, and biliary disease, consistent with UCB rozanolixizumab clinical trial exclusions.*

Sources: Milliman Internal Data Jan 2019 through Dec 2020, Medicare FFS 5% Sample Jan 2019 through Dec 2020, KFF 2021 Health Insurance Coverage of the Total Population.

AIE Comparison: Claims-based versus Literature-based

AIE Prevalence Comparison between Approaches		
Channel	**Literature-based**	**Claims-based***
Commercial	58%	48%
Medicaid	19%	18%
Medicare Advantage**	11%	16%
Medicare FFS**	12%	18%

**2020 AIE broad definition* (G04.81 diagnosis code) *with 2+ diagnoses.*

While the literature-based approach relied on age, sex, and race distributions from the literature, as well as U.S. enrollment statistics, the claims-based analysis relied on member distribution in the claims data.

*** An increased Medicare and decreased commercial mix in the claims-based approach suggest patients may qualify for Medicare under disability after diagnosis.*

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Methodology, Assumptions, and Limitations

Methodology, Assumptions and Limitations

Literature-based analysis

- For this approach, we first researched U.S. national enrollment for Medicare, commercial, and Medicaid payer channels. National enrollment was segmented by age, gender, and race for each of the payer channels.
- Using peer reviewed journal publications, published literature, epidemiology studies, etc., for the conditions of interest, we captured the prevalence, incidence, age distribution, male-female ratio, and race characteristics (as appropriate).
- Given the age-sex-race distributions of the conditions of interest, we distribute the prevalent and incident population across commercial, Medicare, and Medicaid payer channels using the U.S. national enrollment statistics, resulting in the number of affected individuals covered under each channel. For example, a condition that affects an older population will have a larger portion of the prevalent / incident population allocated to Medicare, since the U.S. enrollment statistics indicate most aged 65+ population in the U.S. have Medicare.
- We developed separate analyses for AIE, as well as AIE LGI-1.
- The benefit of this method is that it intends to capture all patients with the disease, not just those identifiable in claims data, given these rare diseases often do not have a specific ICD-10 diagnosis code or treatment.
- A limitation of this method is that it may overestimate the commercial population while underestimating the Medicare population because the prevalence rates used did not consider disability status.
- We made minor adjustments to the reported distribution of membership relative to their source data:
  - The primary coverage over 65 commercial population was adjusted to account for beneficiaries EGWP and Medicare Supplement policies relative to reported policy counts.
  - The Medicare breakout into Medicare Advantage and Medicare FFS were based on known, aggregate membership distribution.

Methodology, Assumptions and Limitations

Claims-based analysis

- Reviewed claims for ~94 million members across 2019 and 2020, identifying members with the broad AIE and AIE with clinical trial exclusions to develop payer channel specific prevalence rates.
- AIE definitions:
  - **Broad AIE** is defined as the prevalence of members with diagnosis code G04.81.
    - This definition includes multiple types of autoimmune encephalitis, not limited to leucine-rich glioma inactivated (LGI-1) autoimmune encephalitis.
  - **AIE with Clinical Trial Exclusions** is defined as the prevalence of members with a diagnosis code of G04.81, excluding members with diagnosis codes that align with clinical trial exclusions.
    - Exclusions include chronic infections (Hepatitis B, Hepatitis C, HIV, Tuberculosis), liver disease, certain gastrointestinal disorders, cancer, epilepsy, transplant, splenectomy, renal impairment, primary immunodeficiency, and biliary disease, consistent with clinical trial exclusions. https://clinicaltrials.gov/ct2/show/NCT04875975
  - We relied on a diagnosis code that includes multiple types of AIE, not limited to LGI-1. While our AIE with Clinical Trial Exclusions approach attempts to align to the clinical trial population as much as possible, there is no diagnosis code for the LGI-1 subtype of AIE.
- We extrapolated the calculated prevalence rates by payer channel to the nationwide payer channel distribution to arrive at the results.

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Appendix

AIE Prevalence by Channel – Total Diagnosed Lives

	2019		2020	
Channel	**Broad AIE (G04.81)**	**AIE with Clinical Trial Exclusions**	**Broad AIE (G04.81)**	**AIE with Clinical Trial Exclusions**
Commercial	6,922	3,116	6,719	3,046
Medicaid	2,337	1,092	2,620	1,037
Medicare Advantage	2,265	577	2,308	778
Medicare FFS	2,399	630	2,402	689
Total	**13,923**	**5,415**	**14,049**	**5,550**

Sources: Milliman Internal Data Jan 2019 through Dec 2020, Medicare FFS 5% Sample Jan 2019 through Dec 2020, KFF 2021 Health Insurance Coverage of the Total Population.

AIE Average Age by Channel

	2019		2020	
Channel	**Broad AIE (G04.81)**	**AIE with Clinical Trial Exclusions**	**Broad AIE (G04.81)**	**AIE with Clinical Trial Exclusions**
Commercial	31.3	23.8	30.9	24.8
Medicaid	32.0	28.8	31.2	28.4
Medicare Advantage	72.0	72.4	70.2	69.9
Medicare FFS	65.3	63.3	65.6	64.4
Total	**38.0**	**29.0**	**36.7**	**30.0**

Sources: Milliman Internal Data Jan 2019 through Dec 2020, Medicare FFS 5% Sample Jan 2019 through Dec 2020, KFF 2021 Health Insurance Coverage of the Total Population.

MOG-AD Literature Based Analysis - Sources

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AIE Literature Based Analysis - Sources

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