

# Healthcare Data Analysis

## Hospital Operations Intelligence

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# Project Overview

## Healthcare Data Analysis: Excel-Based Investigation

This analysis examines 10 years of patient data from Massachusetts General Hospital (2011-2021), covering approximately 1,000 patient records with medical encounters, treatment costs, insurance coverage, and medical procedures.

### Focus Areas:

- Identifying revenue leakage from insurance coverage gaps
- Understanding patient readmission patterns and safety concerns
- Analyzing encounter distribution across different care types
- Evaluating procedure costs and resource allocation



# Dataset and Methodology

## Dataset:

- Time Period: 2011-2021 (10 years)
- Records: 1,000+ patients, 27,000+ encounters
- Source: Maven Analytics Hospital Challenge Dataset

## Analysis Method:

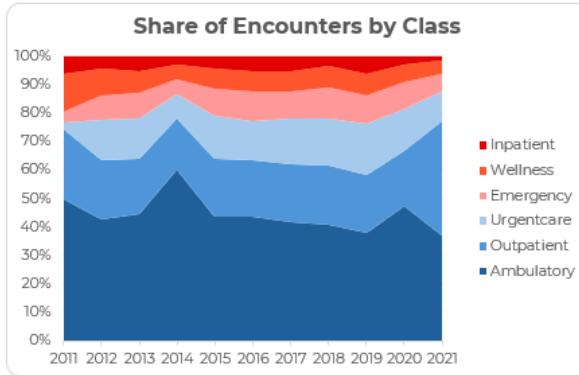
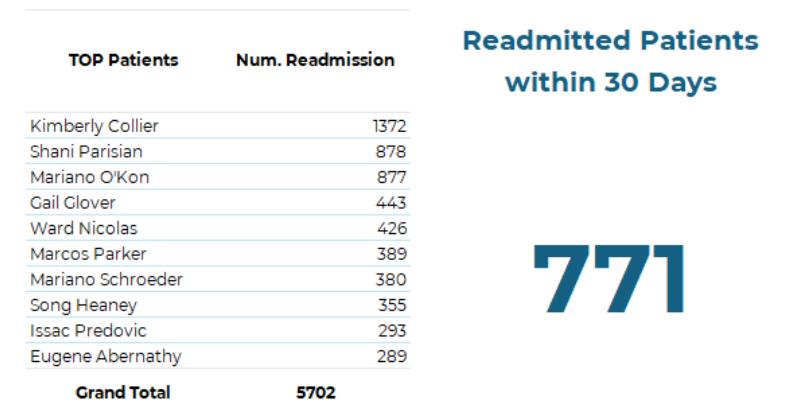
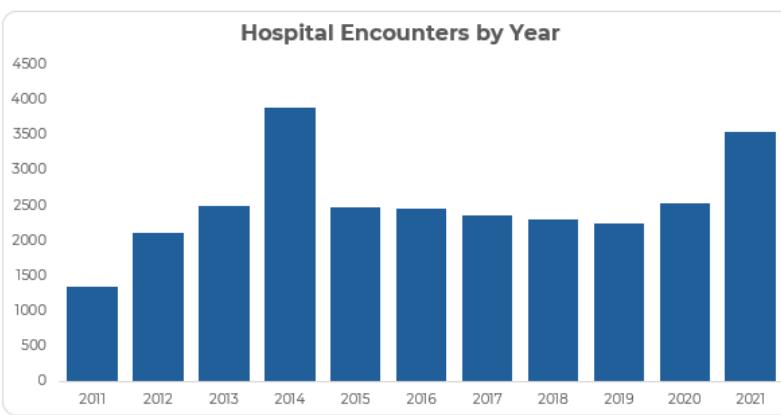
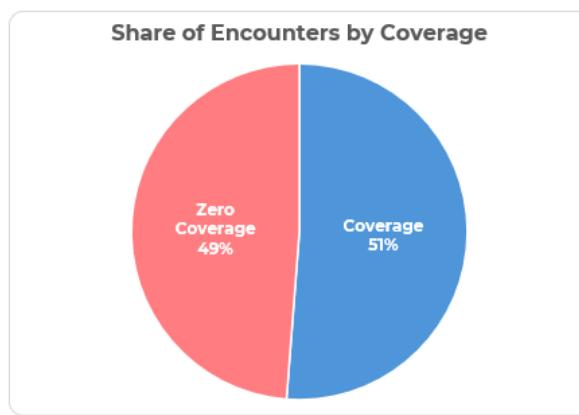
- Tool: **Microsoft Excel** (Pivot Tables, Formulas, Aggregation)
- Techniques: Data pivoting, conditional aggregation, trend analysis
- Related Version: **SQL analysis** available on [GitHub](#) (alternative approach)



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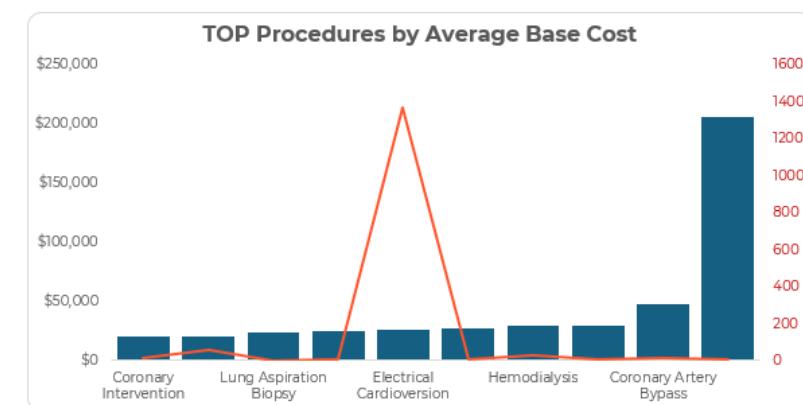
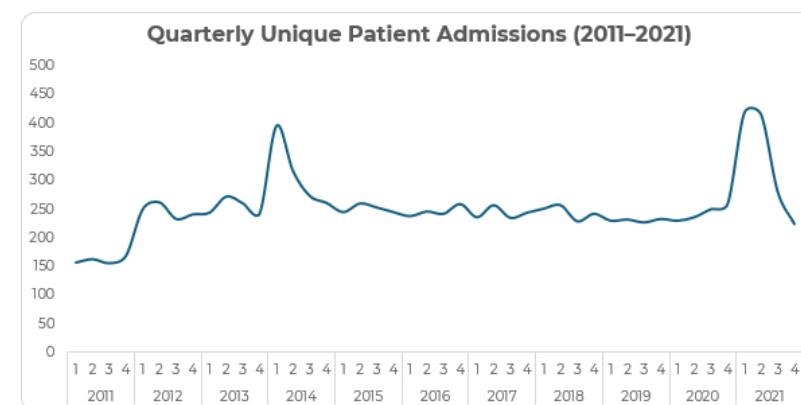
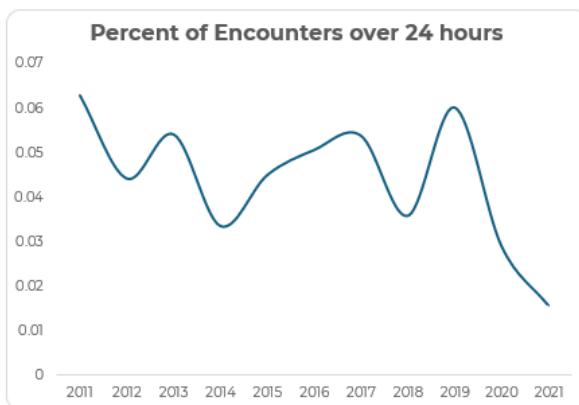


# Hospital Operations Intelligence



**Encounter Class Distribution by Year**

YEAR	Encounter	Class	Ambulatory	Outpatient	Urgencare	Emergency	Wellness	Inpatient
2011			50%	24%	2%	4%	13%	6%
2012			42%	21%	14%	9%	9%	4%
2013			44%	19%	14%	9%	7%	5%
2014			60%	18%	8%	6%	5%	3%
2015			43%	20%	15%	9%	7%	4%
2016			44%	20%	14%	10%	7%	5%
2017			42%	20%	16%	9%	7%	5%
2018			41%	21%	16%	11%	8%	4%
2019			38%	20%	18%	10%	8%	6%
2020			47%	20%	14%	9%	6%	3%
2021			37%	40%	11%	6%	4%	2%
<b>Grand Total</b>			<b>45%</b>	<b>23%</b>	<b>13%</b>	<b>8%</b>	<b>7%</b>	<b>4%</b>

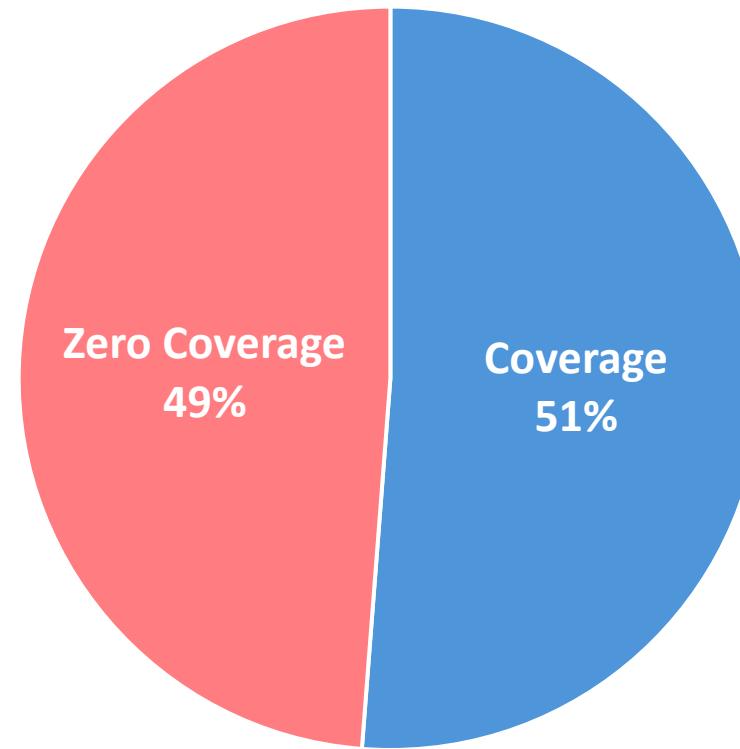


# **Insurance Coverage Gap**

## **\$49M Annual Revenue Risk**

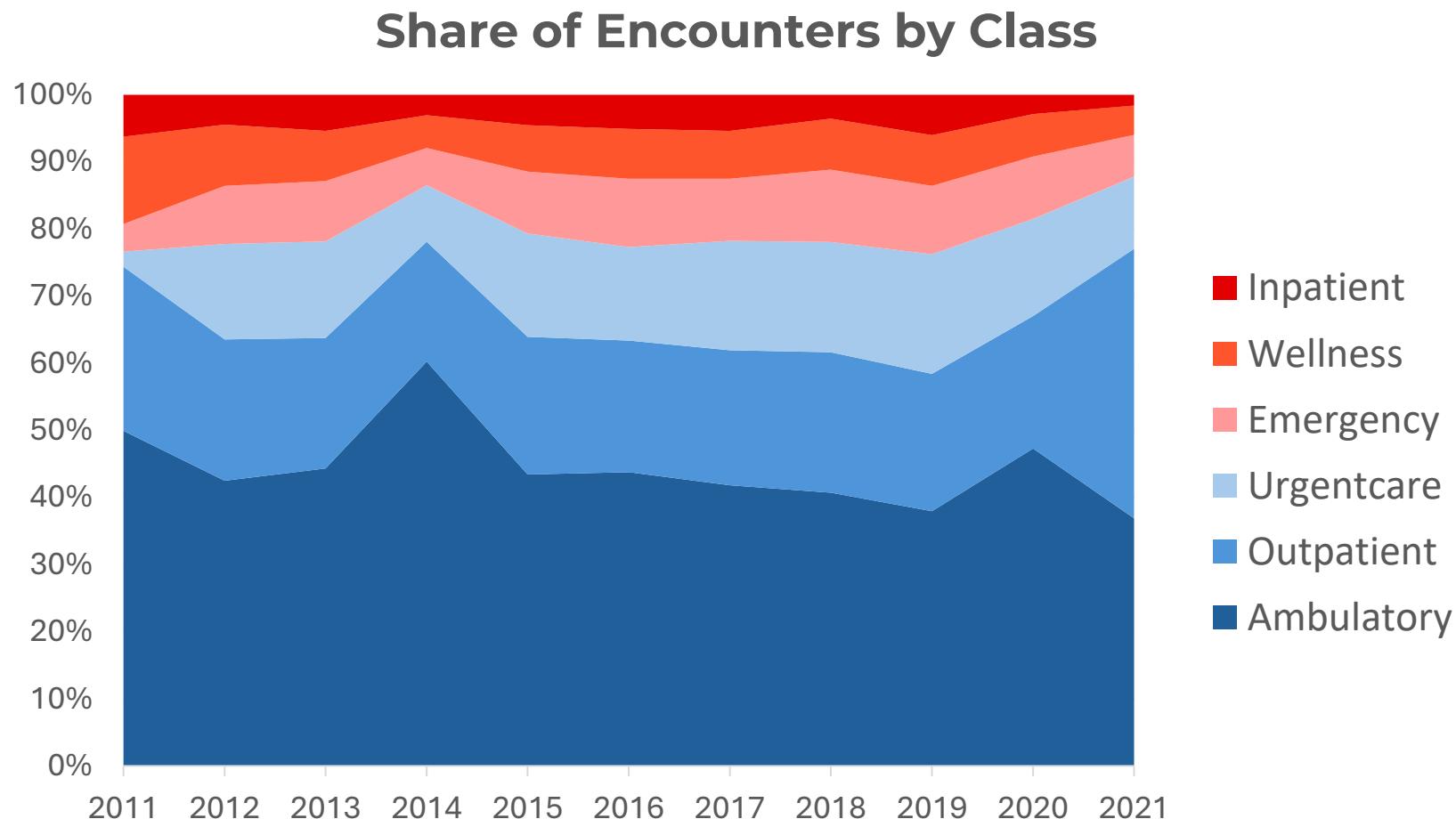
Nearly half of hospital encounters lack insurance coverage, creating significant revenue exposure

**Share of Encounters by Coverage**



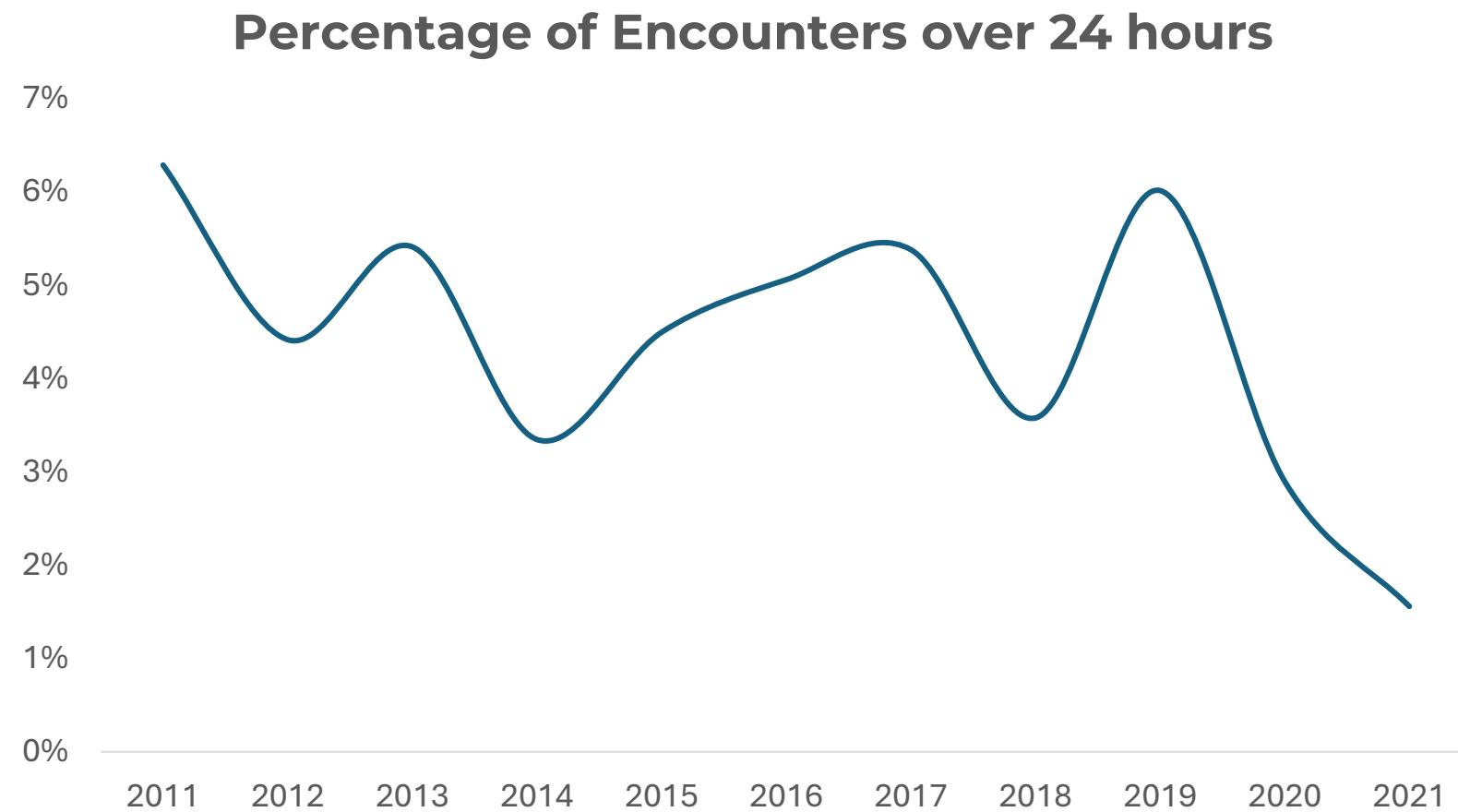
# Ambulatory Dominance

Ambulatory encounters continue to dominate, reflecting primary healthcare demand



# Improving Operational Efficiency: Shorter Patient Stays

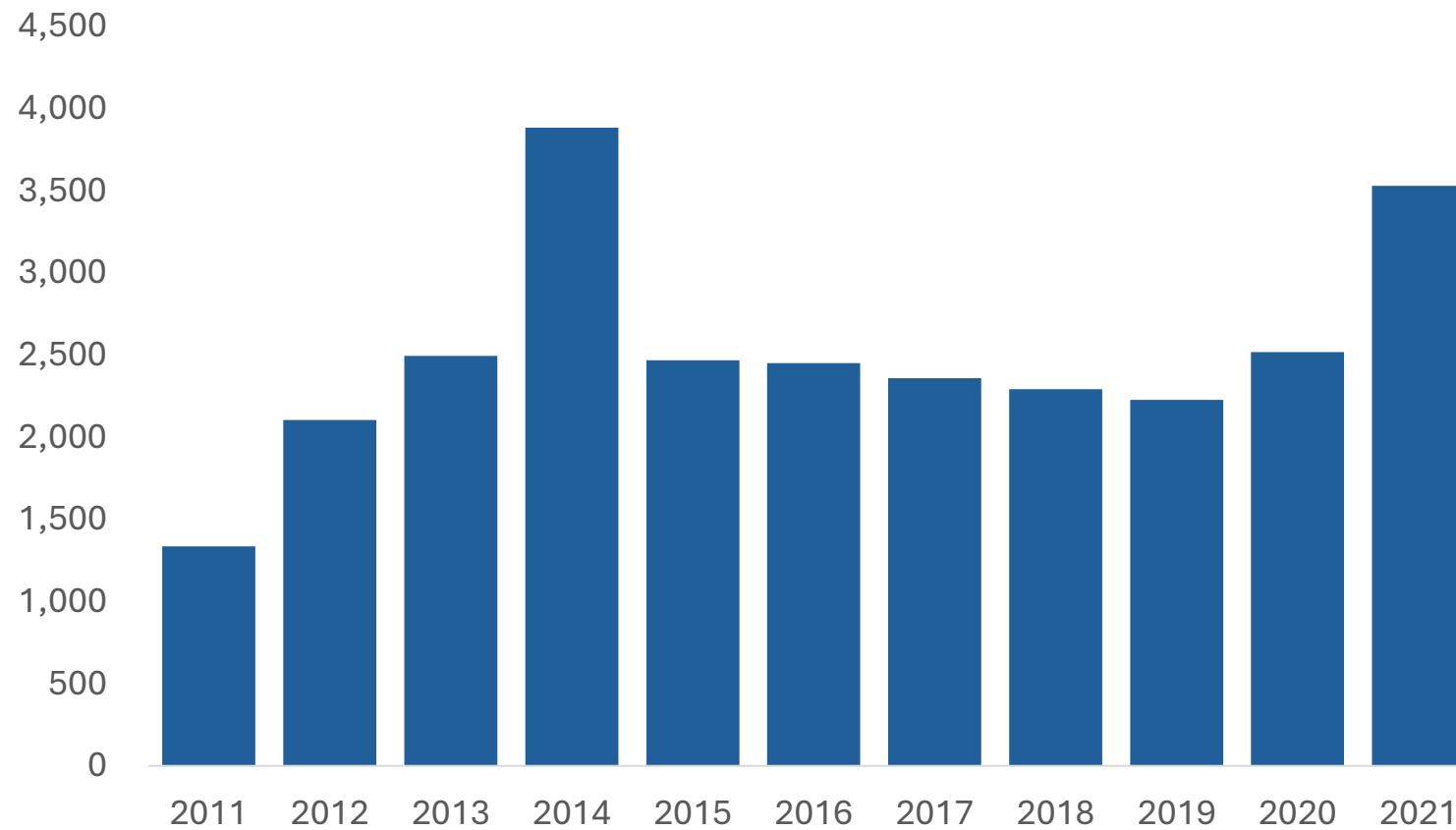
Patients are being discharged faster, reducing hospital stays. This means fewer infections, lower costs, and beds available for more patients.



# Patient Encounters: From Decline to Recovery

After years of decline, hospital encounters show recovery, reaching near-peak levels in 2021

**Hospital Encounters by Year**



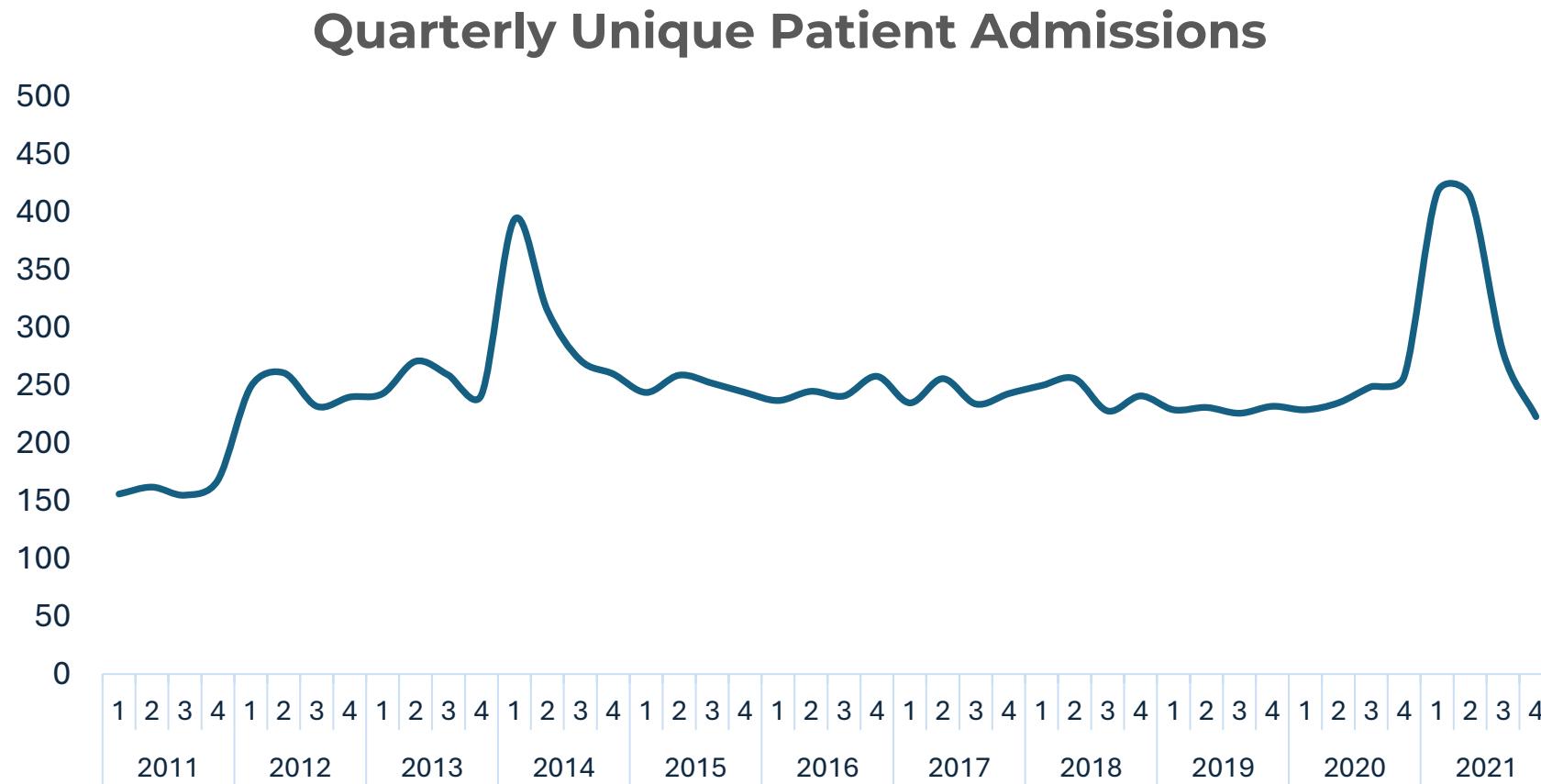
# Service Distribution Over Time

Outpatient share roughly doubled, while ambulatory declined from 50% to 37%. Urgent care grew significantly from 2% to 11%, and emergency care increased from 4% to 6%. Meanwhile, wellness and inpatient services declined to nearly one third.

YEAR	Ambulatory	Outpatient	Urgentcare	Emergency	Wellness	Inpatient
2011	50%	24%	2%	4%	13%	6%
2012	42%	21%	14%	9%	9%	4%
2013	44%	19%	14%	9%	7%	5%
2014	60%	18%	8%	6%	5%	3%
2015	43%	20%	15%	9%	7%	4%
2016	44%	20%	14%	10%	7%	5%
2017	42%	20%	16%	9%	7%	5%
2018	41%	21%	16%	11%	8%	4%
2019	38%	20%	18%	10%	8%	6%
2020	47%	20%	14%	9%	6%	3%
2021	37%	40%	11%	6%	4%	2%
<b>Grand Total</b>	<b>45%</b>	<b>23%</b>	<b>13%</b>	<b>8%</b>	<b>7%</b>	<b>4%</b>

# Admission Capacity Management: Quarterly Trends

Hospital experienced two major admission surges (2014 and 2021), followed by sharp decline



# Medicaid Provides Highest Reimbursement

Medicare dominates volume with 11,371 encounters generating \$24.6M in revenue, while Medicaid leads in per-encounter reimbursement (\$6,205). However, 8,807 uninsured encounters totaling \$49M in service costs receive zero reimbursement, representing 49% of all encounters and the hospital's greatest financial challenge.

## Payers by Reimbursement

PAYER_NAME	ENCOUNTERS	TOTAL CLAIM COST	AVG CLAIM COST
Medicaid	1443	\$8,954,131	\$6,205
NO INSURANCE	8807	\$49,259,290	\$5,593
Anthem	704	\$2,982,715	\$4,237
Humana	1084	\$3,543,921	\$3,269
Blue Cross Blue Shield	925	\$3,002,166	\$3,246
Cigna Health	809	\$2,424,533	\$2,997
UnitedHealthcare	900	\$2,563,508	\$2,848
Aetna	936	\$2,589,956	\$2,767
Medicare	11371	\$24,647,229	\$2,168
Dual Eligible	912	\$1,546,926	\$1,696
<b>Grand Total</b>	<b>27891</b>	<b>\$101,514,376</b>	<b>\$3,640</b>

# Hospital Operations and Expenditures

Specialized procedures like Electrical Cardioversion command premium per-procedure costs, while high-volume admissions to ICU generate the largest total hospital expenditure.

