Seeing Risk Clearly:

High-Impact Data Visualization for Workers' Compensation

State of New Mexico
Workers' Compensation Administration

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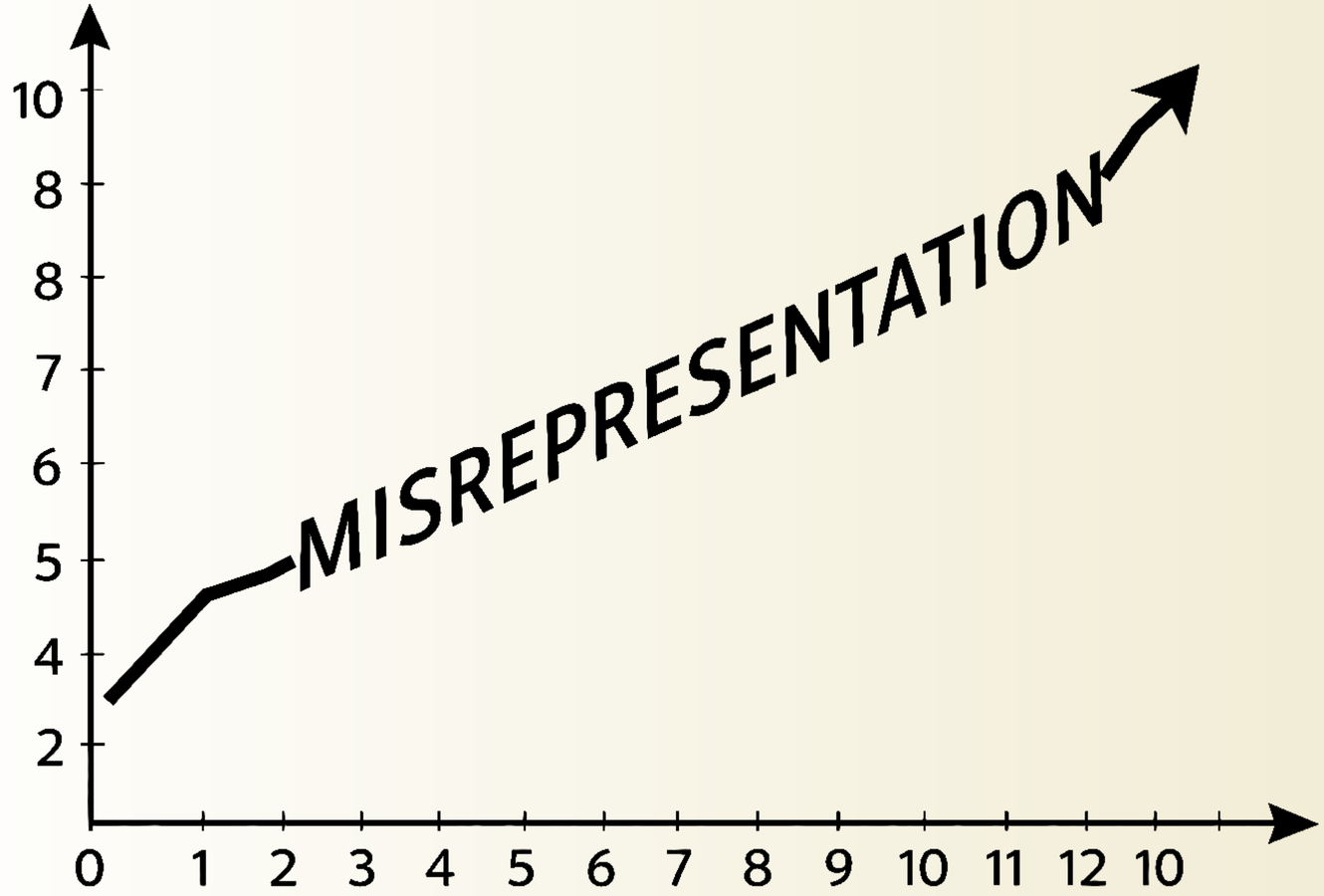
Presented By:
Charles Cordova — Senior Economist
Seth Boateng — Senior Data Analyst

Why Data Visualization Matters in Workers' Compensation

- ❖High-Stakes System
- ❖Early Decisions Matter
- ❖Evidence-Based Policy is Critical
- ❖Visualization is an Operational Necessity
- ❖Improves Transparency & Accountability

Why Visualizations Often Mislead

- Mixed claim maturity
- Distorted averages
- Unadjusted comparisons
- Policy-driven illusions



Misleading vs. Defensible Practices

- Avoid averages and calendar years
- Use medians, cohorts, normalization

Visualization as a Risk-Management Tool

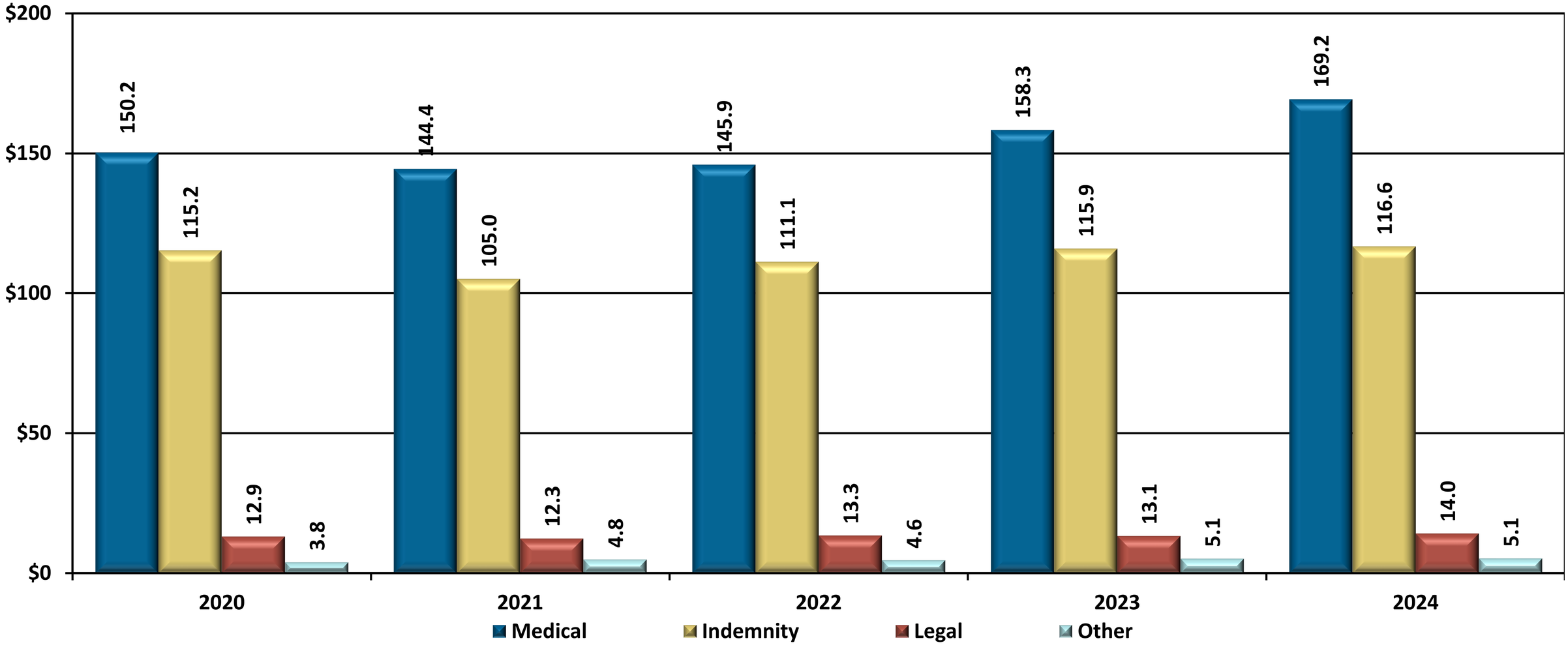
- Pattern recognition
- Frequency vs. severity
- Cost concentration and pathways

What Makes Workers' Compensation Data Different

1. Right-skewed costs
2. Long claim tails
3. Jurisdictional variability
4. Low-frequency, high-severity risk

Frequency–Severity Decomposition

Simple analysis of costs shows medical expenses increased in 2024; however, it does not provide any information as to why costs changed.



Cost Drivers

Concentration of risk

Workers’ compensation costs are highly concentrated: a small share of claims drives most total cost and volatility. This reframes cost management as a targeting problem, not an averaging one. Early identification and active management of high-severity claims offers the greatest leverage.

Cost Components

What actually changed?

Total incurred costs are not a single story. Breaking them into medical, indemnity, and expense components reveals how improvement in one area can be offset by deterioration in another. Without component-level visibility, organizations risk celebrating false gains or overlooking emerging cost pressures.

Frequency–Severity Decomposition

Costs

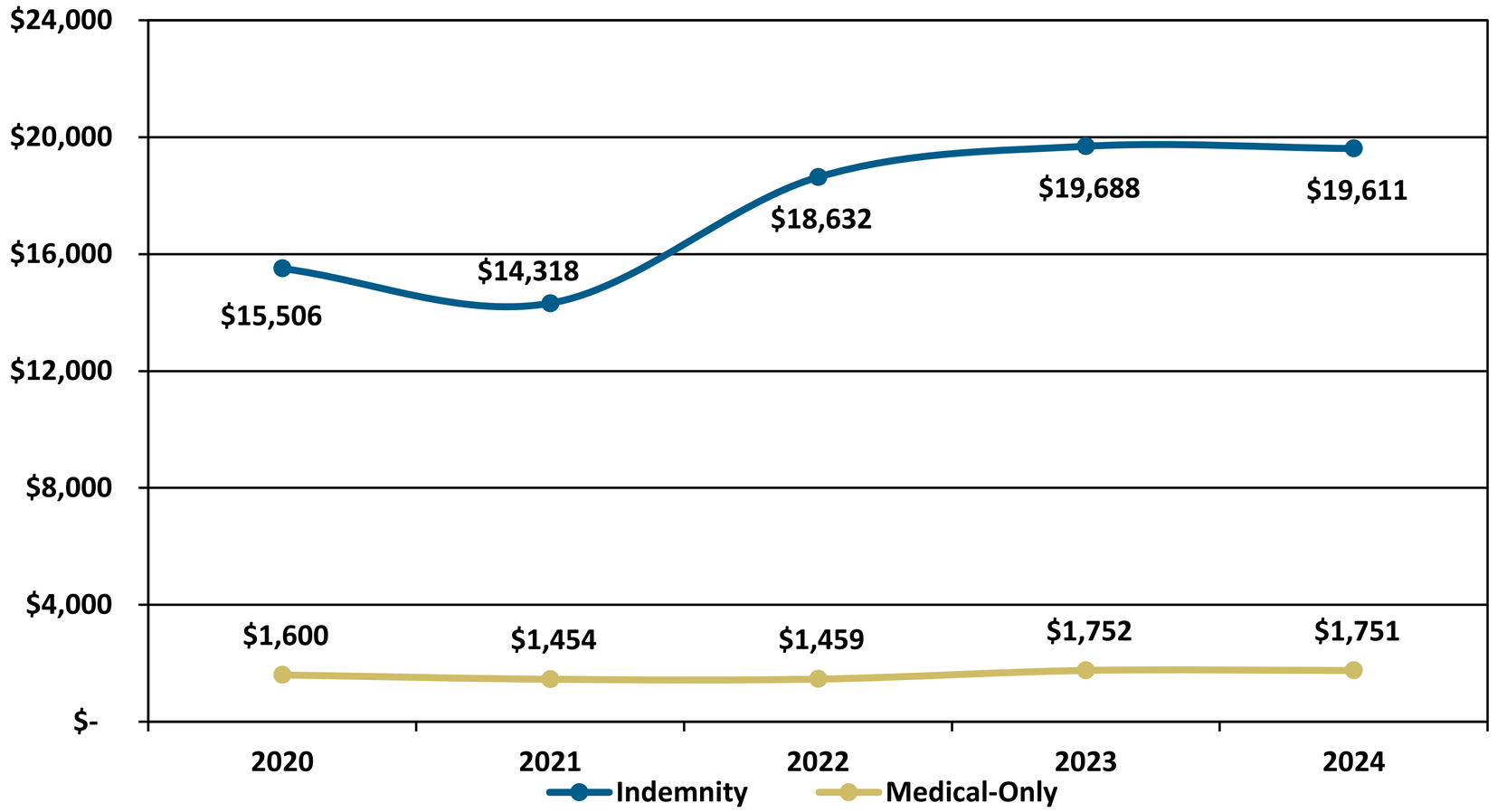
=

Frequency

X

Severity

By looking at each decomposed component, we can gain more information. Our data shows that costs per claim barely changed in 2024, indicating no change in severity.



Frequency–Severity Decomposition

Costs

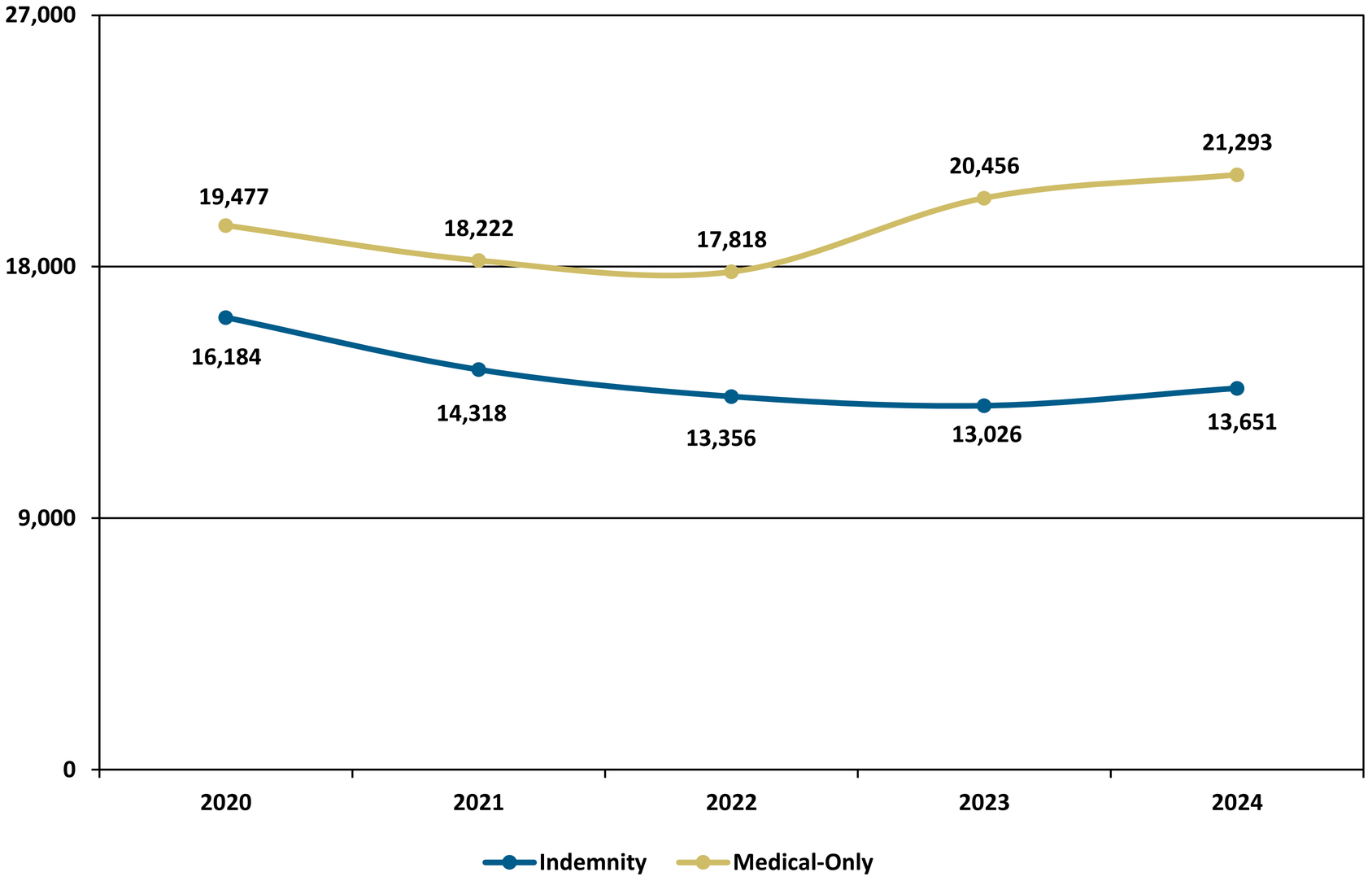
=

Frequency

X

Severity

By identifying that the primary driver of cost was an increase in claim counts, you can better make targeted decisions for intervention



Important Data Topics to Consider for Visualization

Nature of Injury & Part of Body Patterns	Reporting Lag and Claim Outcomes	Geography and Jurisdiction Matter	Cohort-Based Views vs. Calendar-Year Illusions
• Injury mix evolves • Certain injuries predict prolonged disability	• Late reporting predicts higher cost • Associated with litigation and disability	• Statutory and medical system variation • Normalization is essential	• Calendar-year mixes immature claims • Cohorts preserve credibility

Important Data Topics to Consider for Visualization

Financial Exposure Beyond New Claims	Return-to-Work as a Time-to-Event Process	Disability Is Dynamic	Leading Indicators of Successful Outcomes
• Reserve development drives exposure • Volatility matters	• Means distort outcomes • RTW is probabilistic	• Workers transition between states • Binary views miss recovery	• Early modified duty matters • Multiple interacting predictors

The Goal of Workers' Compensation Visualization

Better Decisions. Made Earlier

Clarity

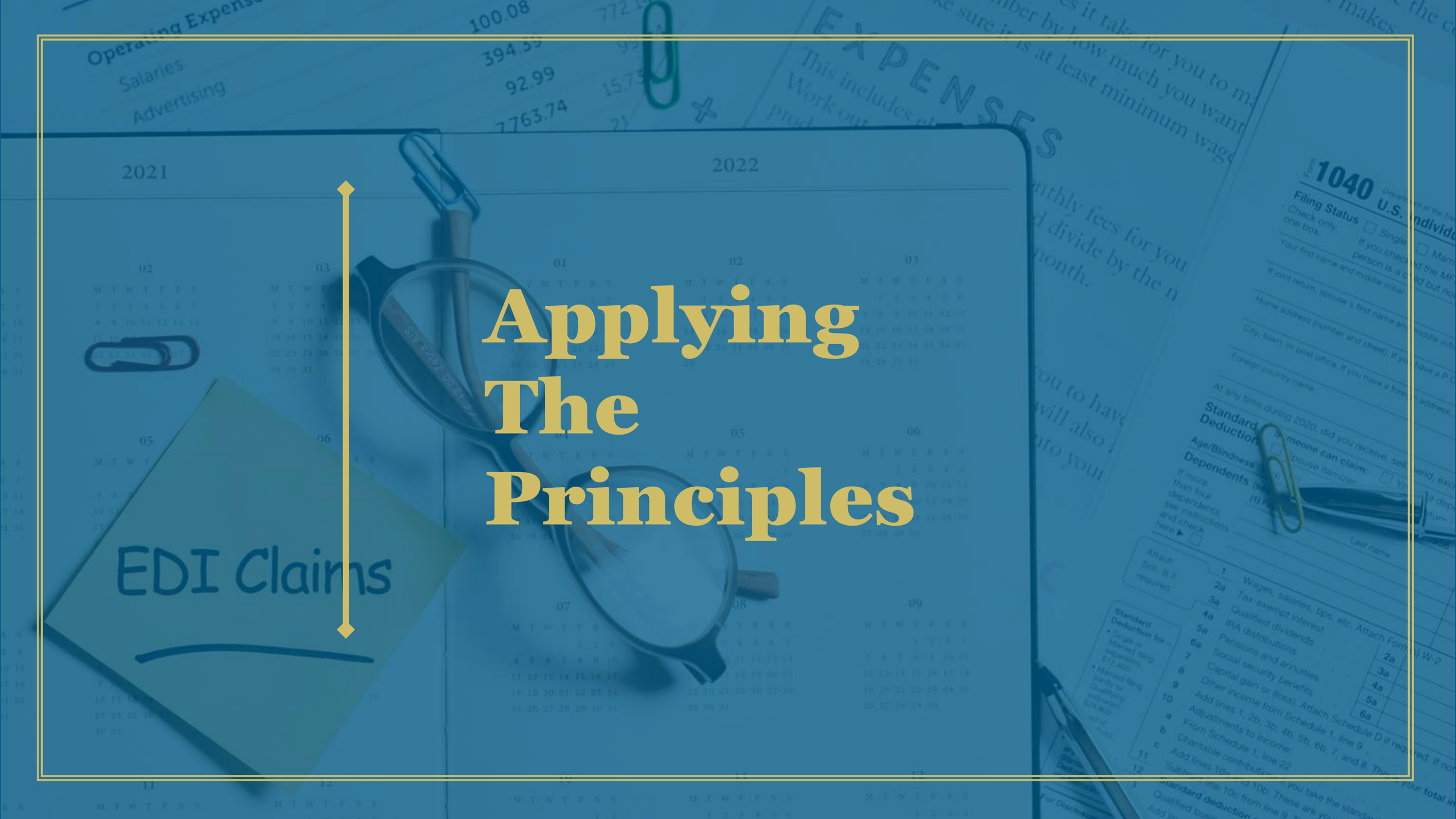
Align stakeholders around a shared understanding of risk and uncertainty.

Timing

Move decisions upstream, when operational leverage is highest.

Accountability

Support defensible, best-practice data-visualization practices the provide the true takeaways, not a false narrative.



Applying The Principles

Our Data Visualization Toolkit

Excel

Familiar and accessible, Excel is often the entry point for new analysts learning data visualization. It handles basic charts well, but seldom produces standout visualizations

Tableau

Tableau is powerful but often awkward to use, with rigid design constraints and a steep learning curve. Its strength is infrastructure, which allows for live, interactive dashboards that Excel and Python cannot easily replicate

Python

Our most powerful tool. It can do anything, but it requires you to have at least a basic understanding of coding. Python isn’t a single tool, but a platform of hundreds that can be deployed as needed.

Our Primary Data Sources

Claims Data

- ❖EDI Claims
- ❖Payer Costs Data (AER)

Agency Data

- ❖Court Cases
- ❖Organizational & Bureau

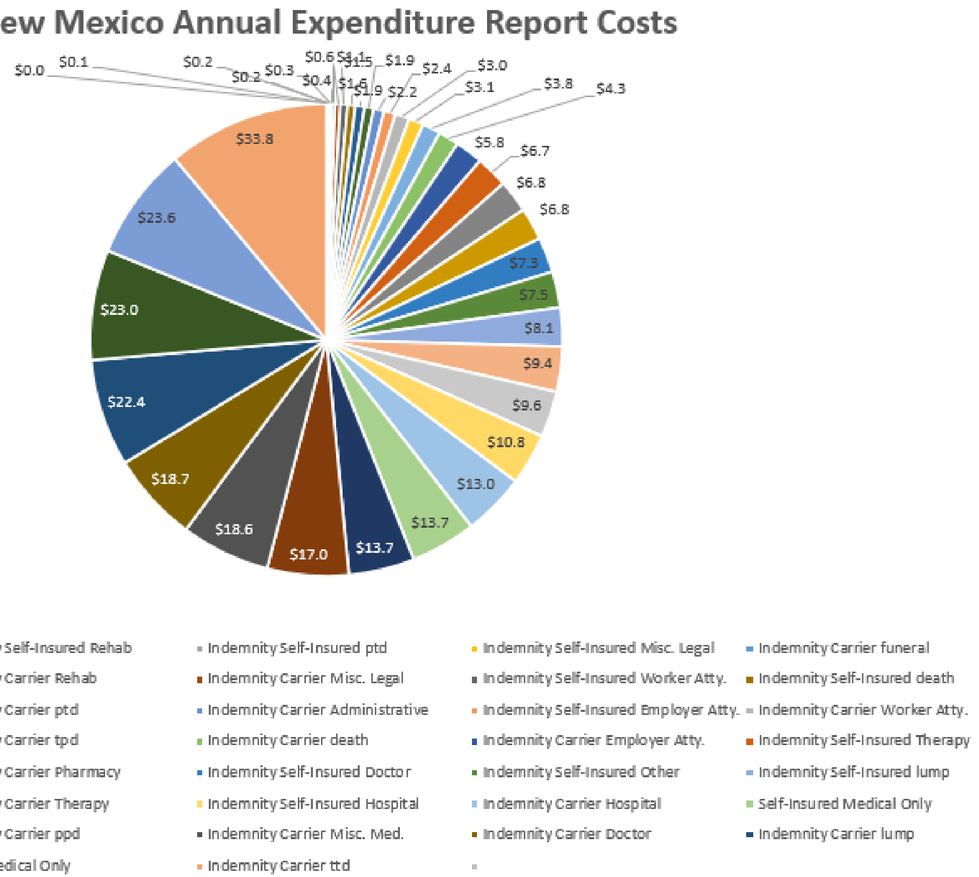
Payer Costs Data

What the AER Costs Data Looks Like

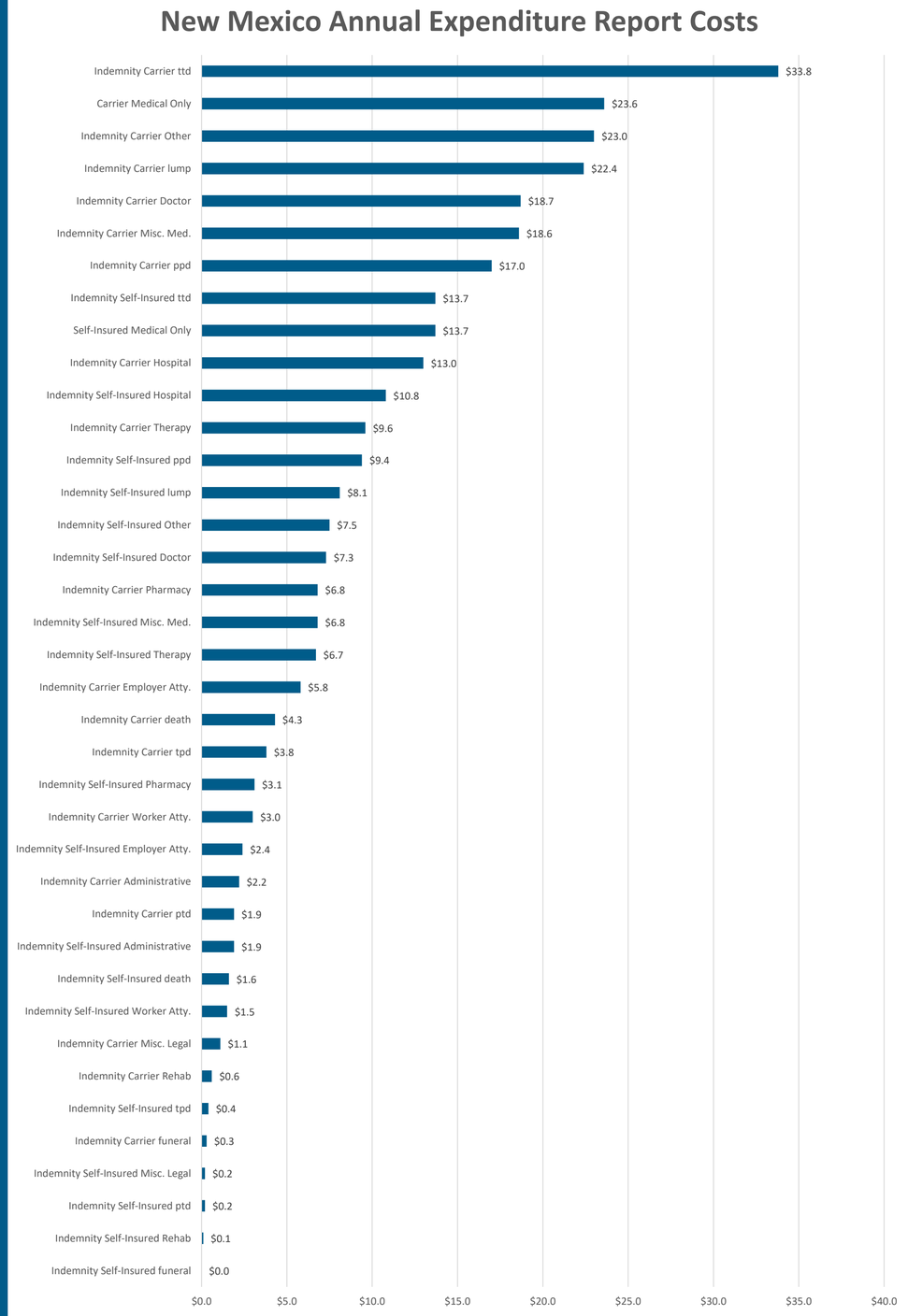
- Aggregated from all payers in the state
- Series of payment categories & values
- Hierarchical structure
- Difficult to design effective visualizations

Year	Expenditure Category	$ (millions)	Payer Type	Claim Type
2024	lump	$8.1	Self Insured	Indemnity
2024	death	$1.6	Self Insured	Indemnity
2024	funeral	$0.0	Self Insured	Indemnity
2024	Employer Atty.	$2.4	Self Insured	Indemnity
2024	Worker Atty.	$1.5	Self Insured	Indemnity
2024	Hospital	$10.8	Self Insured	Indemnity
2024	Therapy	$6.7	Self Insured	Indemnity
2024	Doctor	$7.3	Self Insured	Indemnity
2024	Pharmacy	$3.1	Self Insured	Indemnity
2024	Rehab	$0.1	Self Insured	Indemnity
2024	Administrative	$1.9	Self Insured	Indemnity
2024	Misc. Med.	$6.8	Self Insured	Indemnity
2024	Misc. Legal	$0.2	Self Insured	Indemnity
2024	Other	$7.5	Self Insured	Indemnity
2024	Hospital	$23.6	Carrier	Medical Only
2024	tpd	$3.8	Carrier	Indemnity
2024	ttd	$33.8	Carrier	Indemnity
2024	ppd	$17.0	Carrier	Indemnity
2024	ptd	$1.9	Carrier	Indemnity
2024	lump	$22.4	Carrier	Indemnity
2024	death	$4.3	Carrier	Indemnity
2024	funeral	$0.3	Carrier	Indemnity
2024	Employer Atty.	$5.8	Carrier	Indemnity
2024	Worker Atty.	$3.0	Carrier	Indemnity
2024	Hospital	$13.0	Carrier	Indemnity
2024	Therapy	$9.6	Carrier	Indemnity
2024	Doctor	$18.7	Carrier	Indemnity
2024	Pharmacy	$6.8	Carrier	Indemnity
2024	Rehab	$0.6	Carrier	Indemnity
2024	Administrative	$2.2	Carrier	Indemnity
2024	Misc. Med.	$18.6	Carrier	Indemnity
2024	Misc. Legal	$1.1	Carrier	Indemnity
2024	Other	$23.0	Carrier	Indemnity

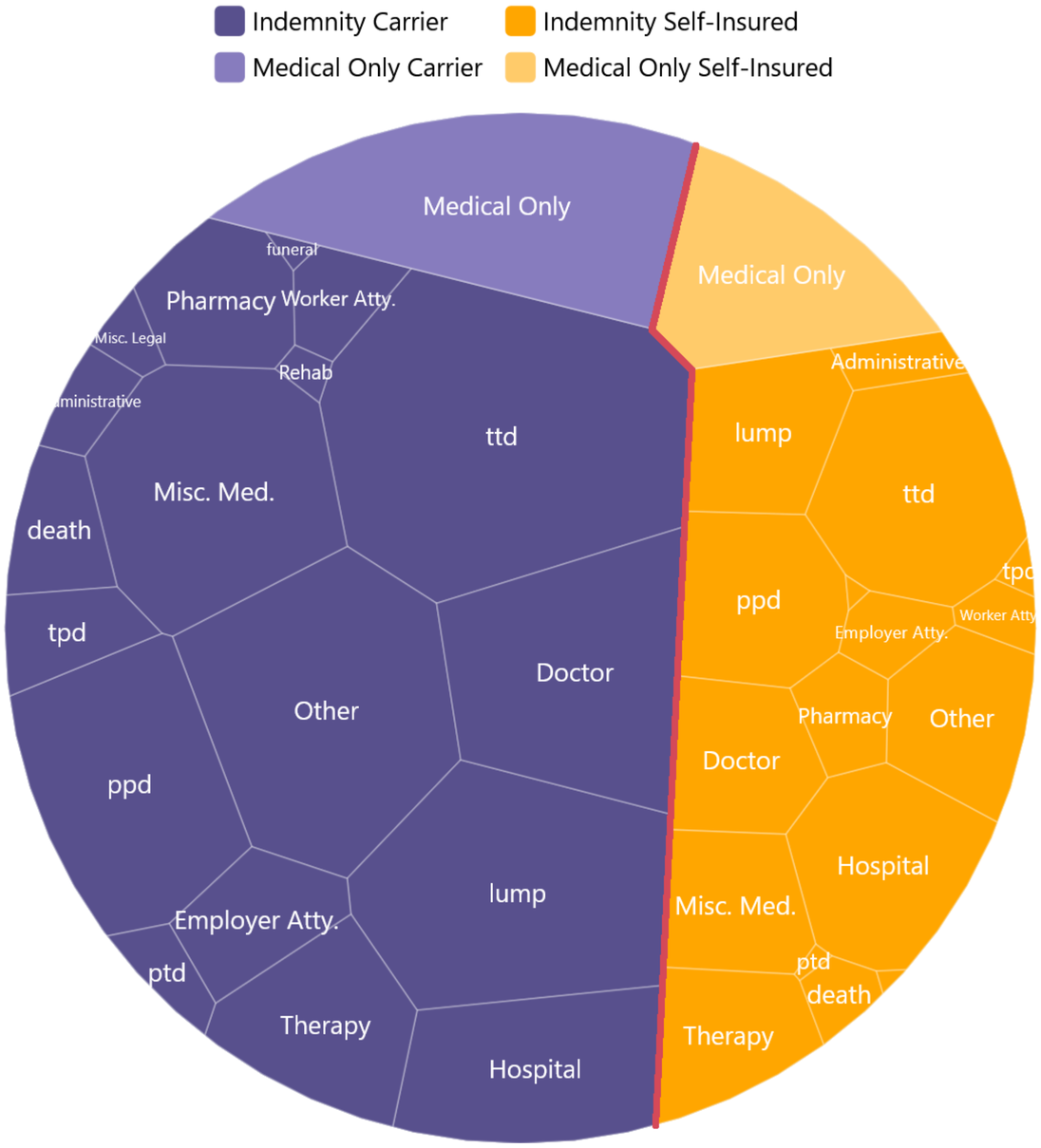
Limitations of Bar & Pie Charts for AER Costs Data



Too Many Categories Makes it Difficult to Interpret



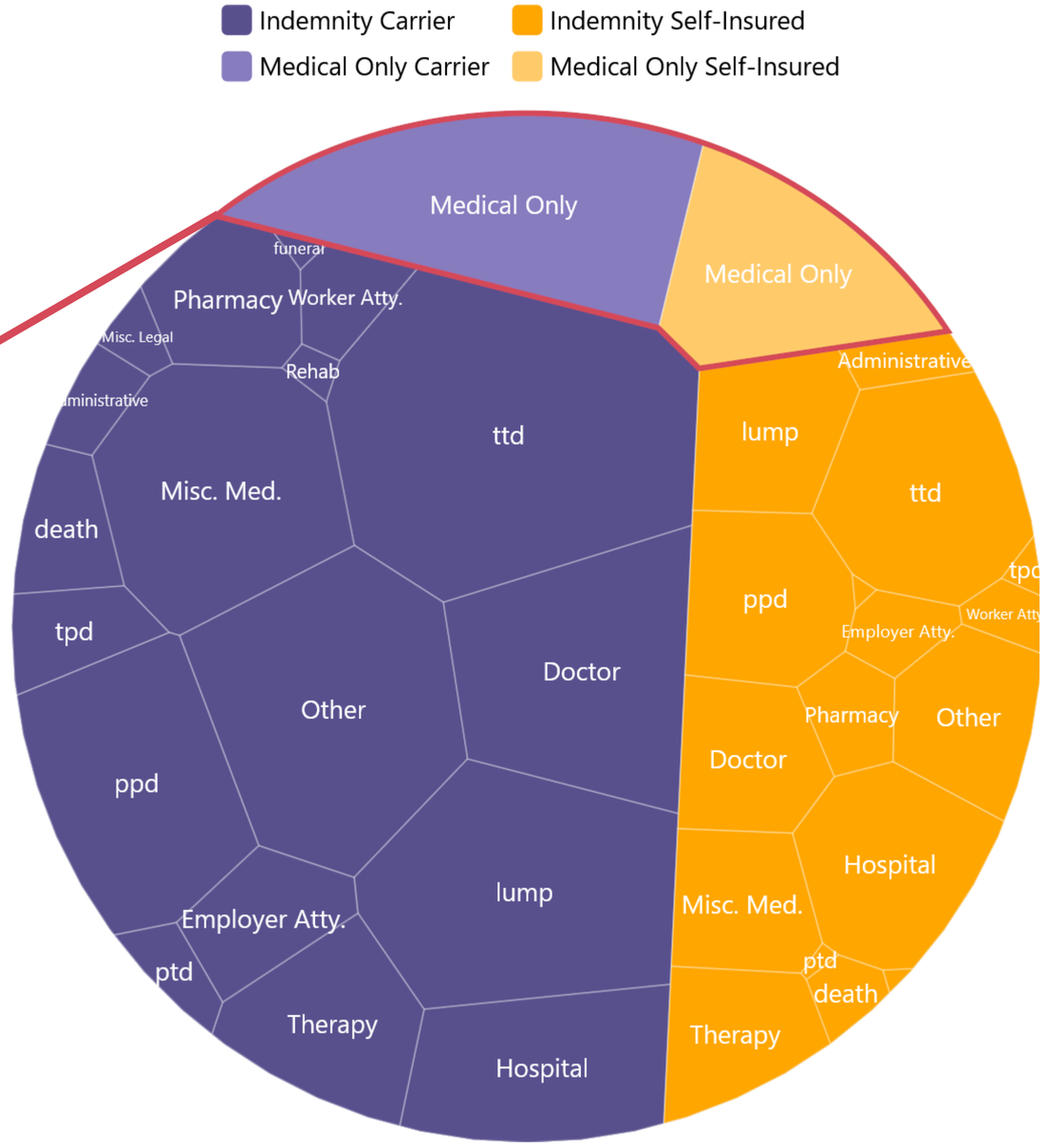
Treemaps: A Good Alternative to Pie Charts



Voronoi Treemap of AER Costs Data

Treemaps: A Good Alternative to Pie Charts

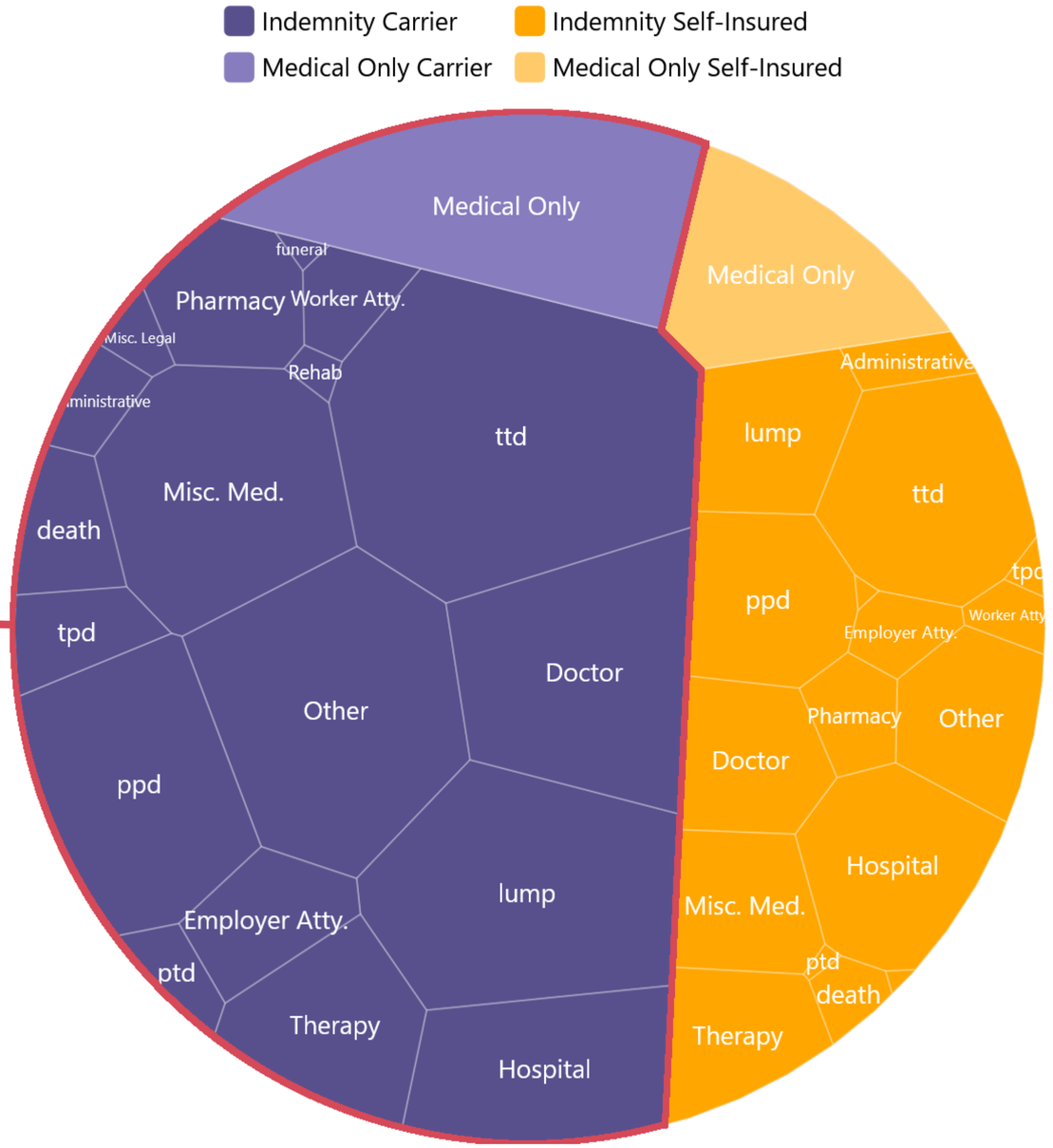
- Shade shows first hierarchy: **Claim Type**



Voronoi Treemap of AER Costs Data

Treemaps: A Good Alternativ to Pie Charts

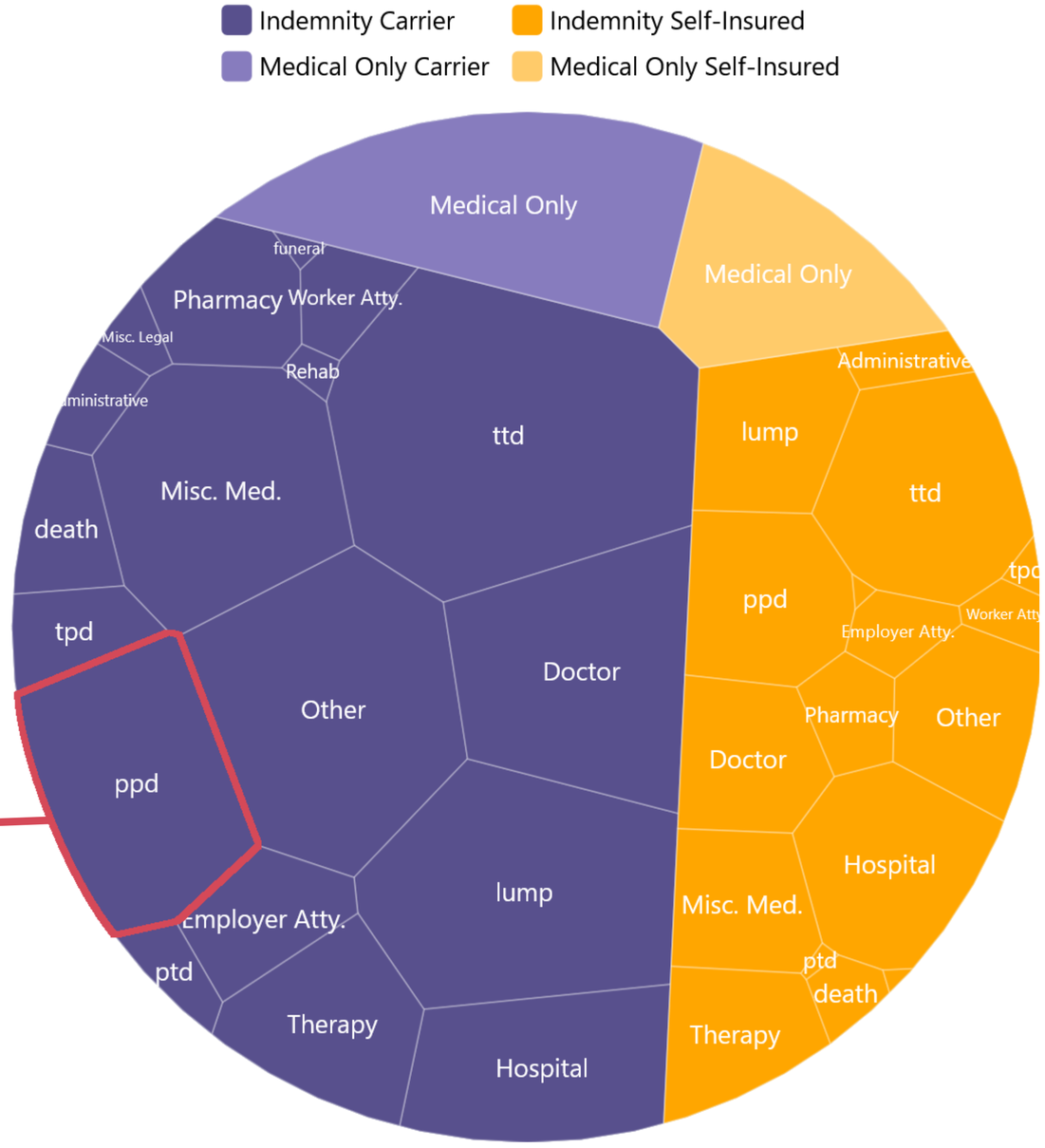
- Shade shows 1st hierarchy: **Claim Type**
- Color shows 2nd hierarchy: **Payer Type**



Voronoi Treemap of AER Costs Data

Treemaps: A Good Alternative to Pie Charts

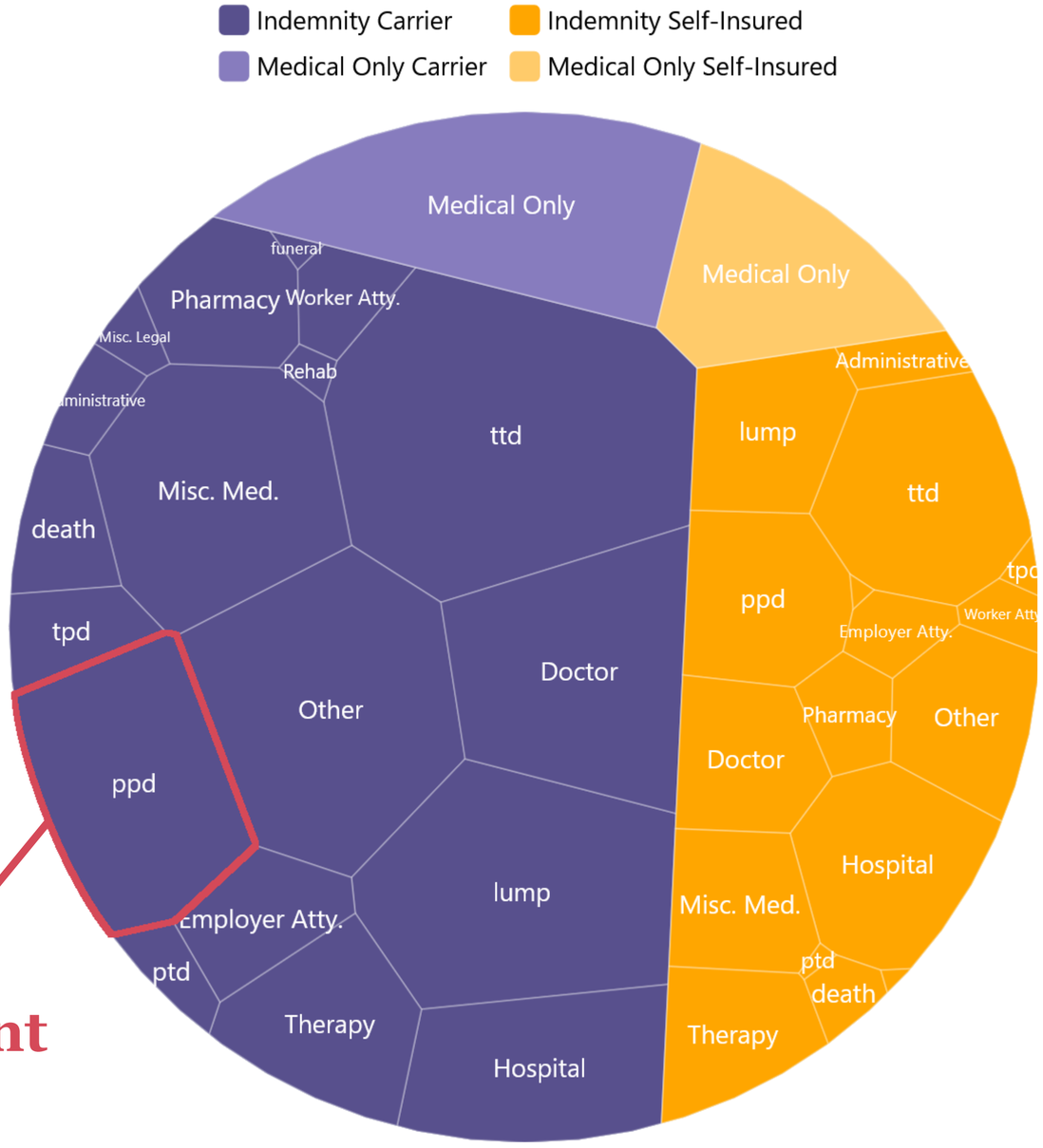
- Shade shows 1st hierarchy: **Claim Type**
- Color shows 2nd hierarchy: **Payer Type**
- Individual cells show **payment type**



Voronoi Treemap of AER Costs Data

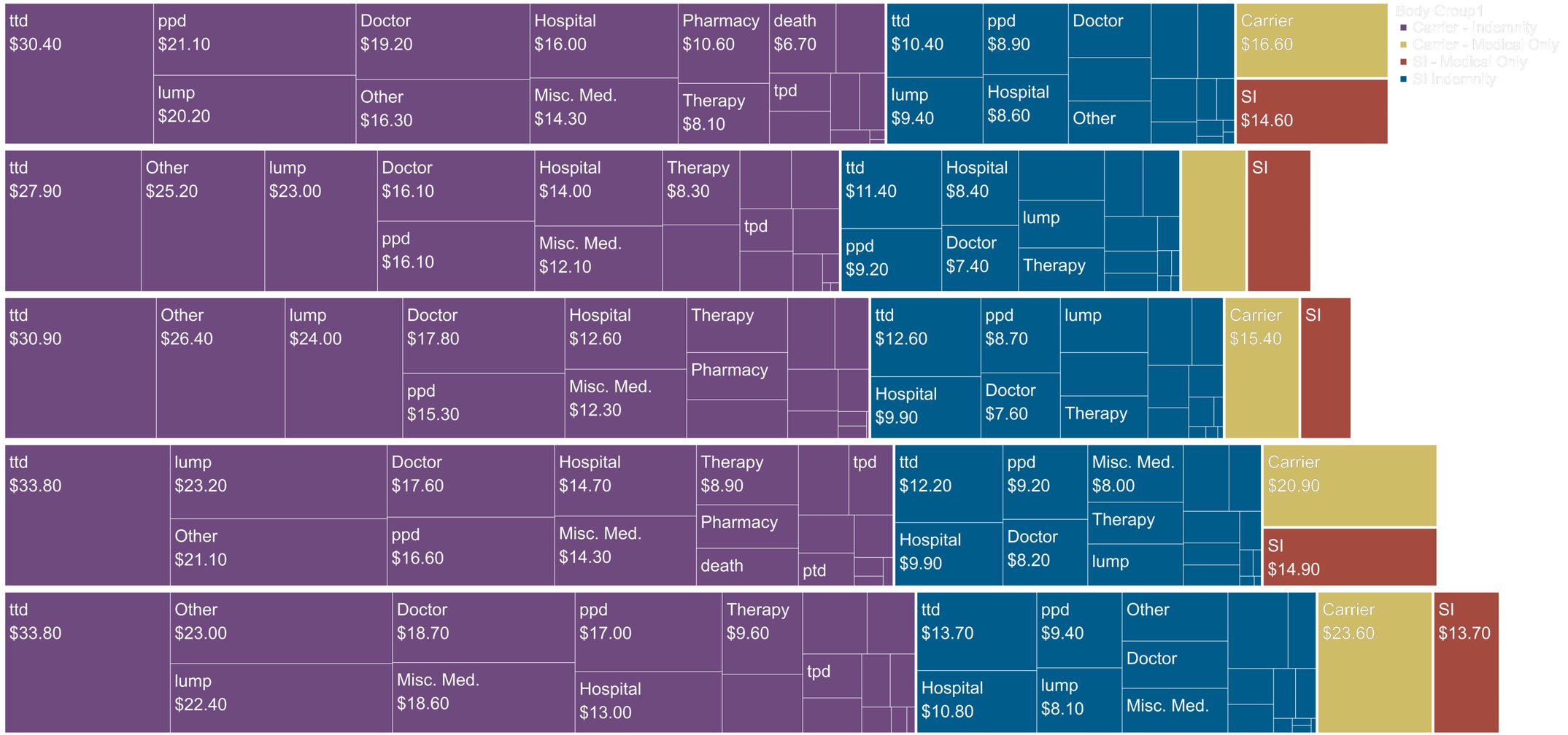
Treemaps: A Good Alternative to Pie Charts

- Shade shows 1st hierarchy: **Claim Type**
- Color shows 2nd hierarchy: **Payer Type**
- Individual cells show **payment type**
- Cell size represents the **expenditure amount**



Voronoi Treemap of AER Costs Data

Treemap Barcharts
An Alternative to Traditional Bar Charts

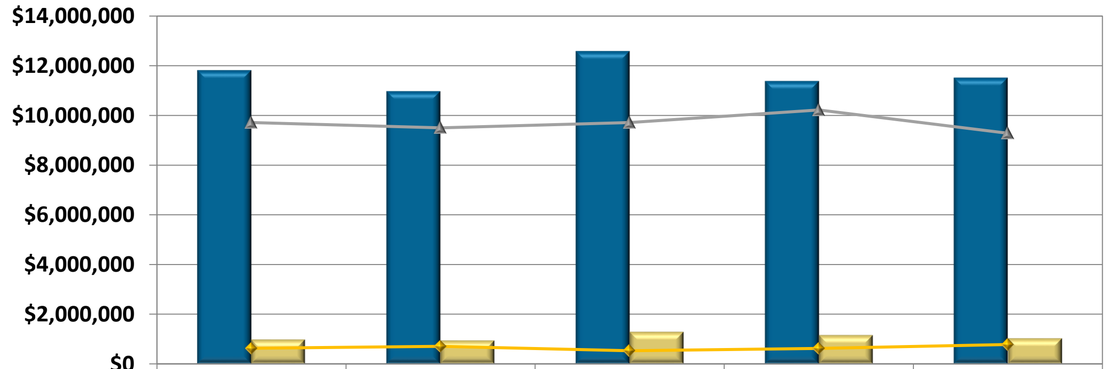


Visualizing Budget Data

Our Old Budget Charts

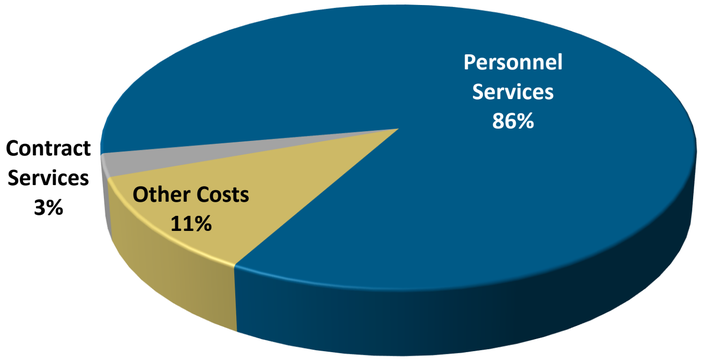
Previously, we used a highly technical **dual-axis clustered bar and line chart** to show our revenues and expenditures as a time series. Fund balances were not showed at all.

Clustered Bar Chart of Revenues and Expenditures



	2017	2018	2019	2020	2021
WCA Revenues	$11,807,914	$10,964,656	$12,579,737	$11,374,107	$11,507,020
UEF Revenues	$973,258	$933,196	$1,279,485	$1,146,483	$1,018,187
WCA Expenditures	$9,714,868	$9,499,021	$9,714,392	$10,221,035	$9,283,191
UEF Expenditures	$630,292	$707,396	$528,995	$621,117	$779,971

Expenditures were broken down in **pie charts**, which are difficult for the human mind to process, especially for trends.



Pie Chart Showing Distribution of Expenditures

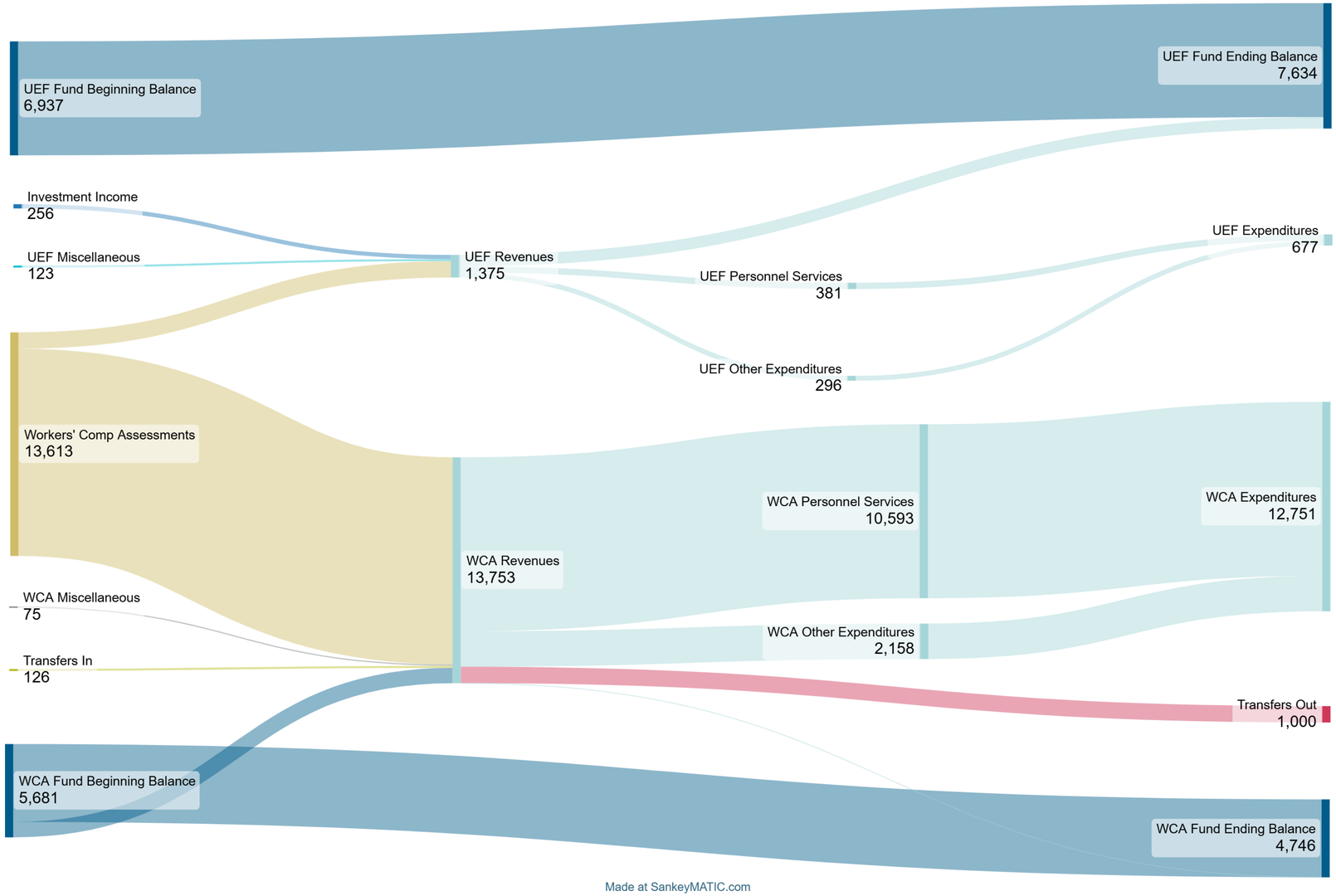
First Alternative: The Sankey Chart

What are they for?

Sankey charts show how quantities flow between categories and are especially useful for visualizing budgets.

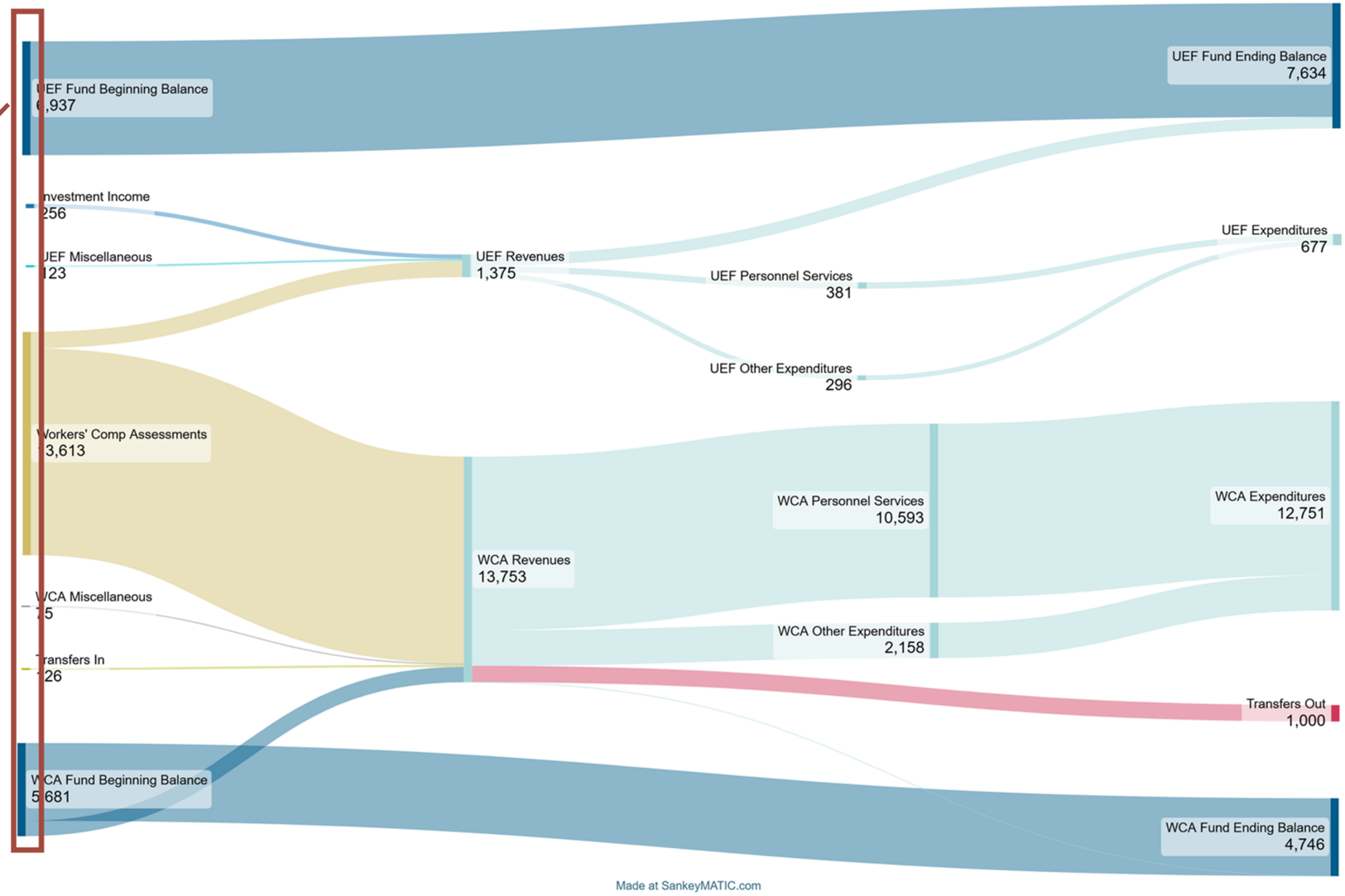
Why Use It?

- ❖Structure and Volume
- ❖Complex Relationships
- ❖Relative Importance
- ❖Extensive Information



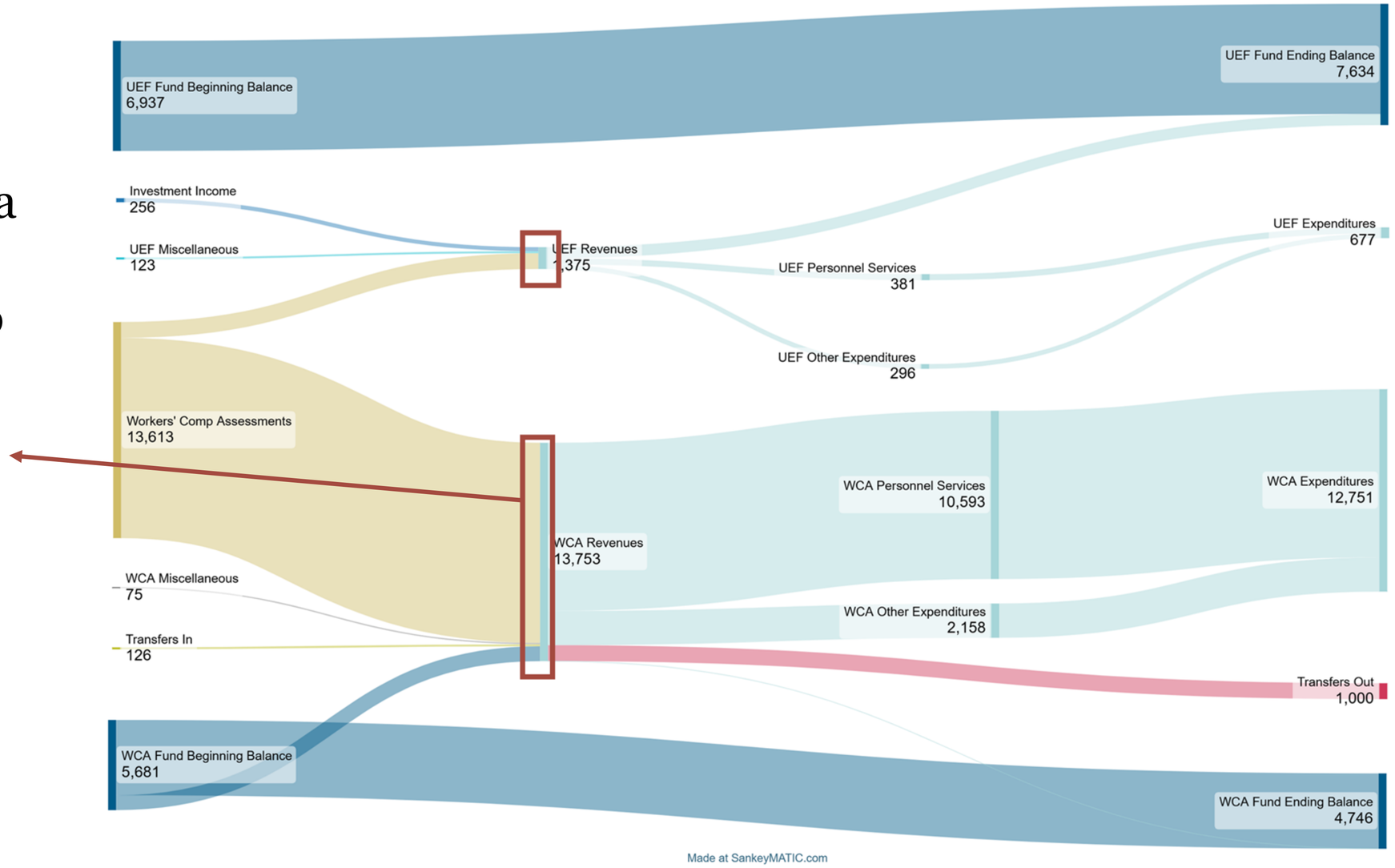
First Alternative: The Sankey Chart

In our example, the first node shows total cash inflows. In our case, this represents total beginning fund balances and revenue sources.



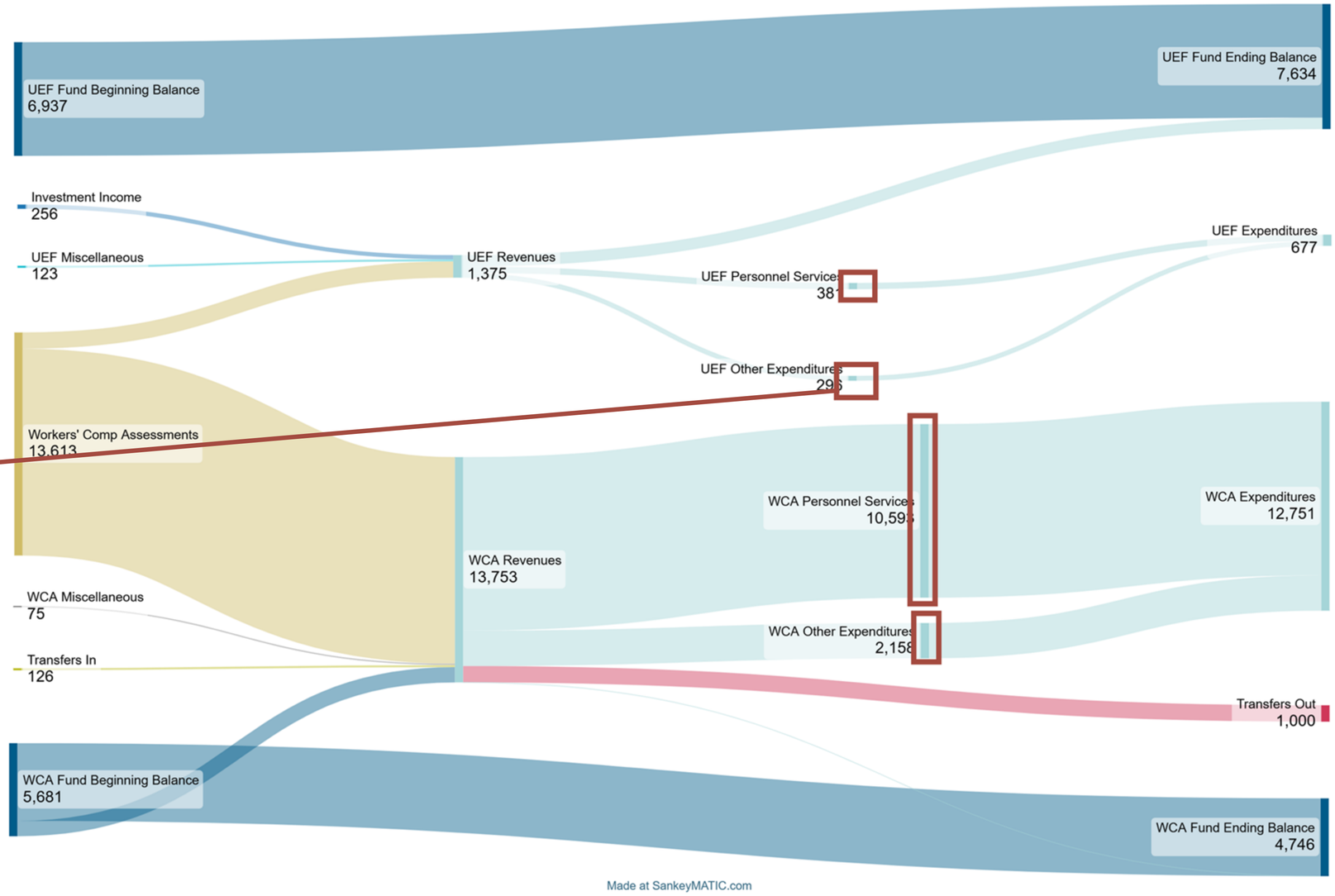
First Alternative: The Sankey Chart

The second node shows a breakdown of which revenue sources apply to the agency, and which apply to our uninsured employer's fund



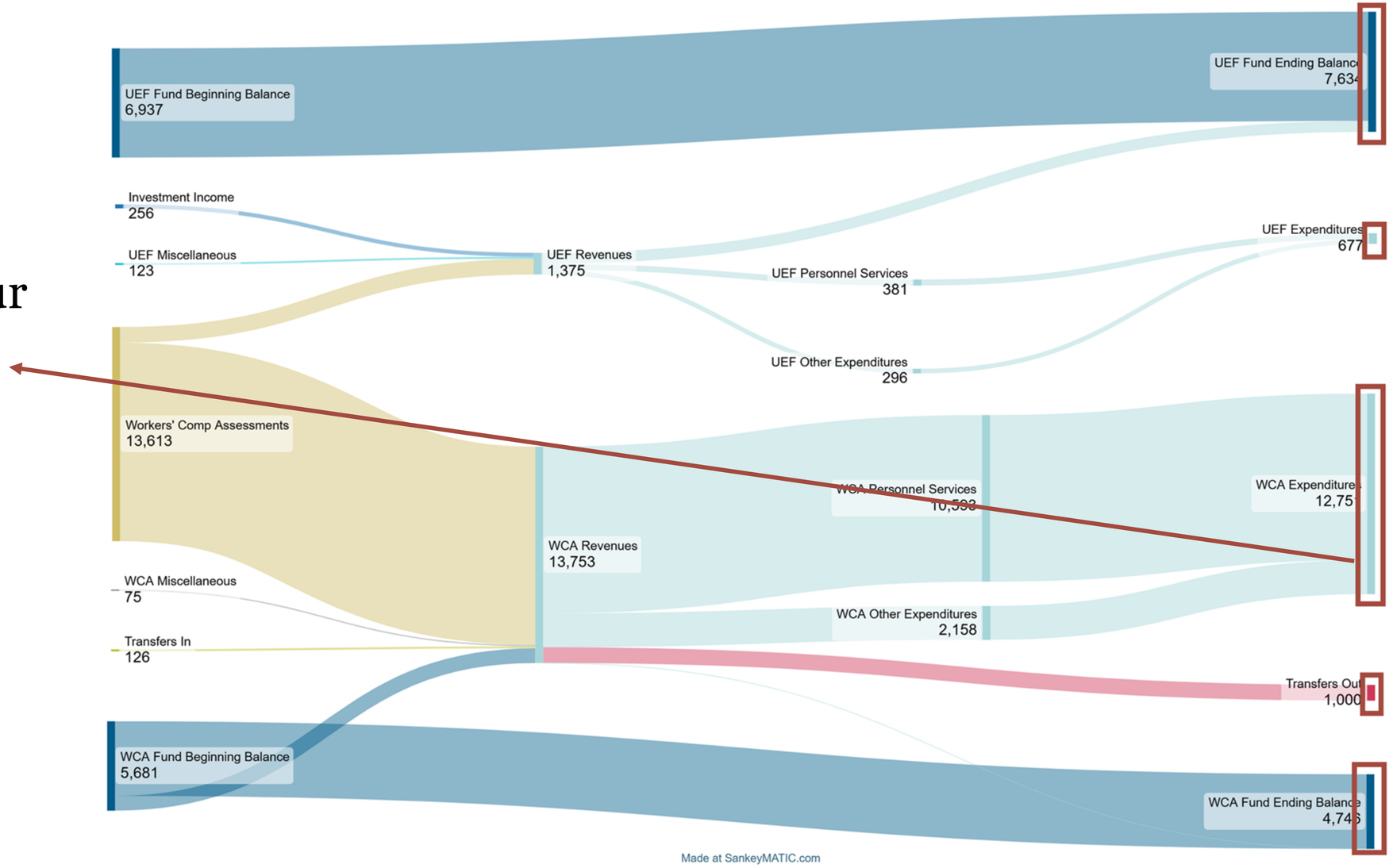
First Alternative: The Sankey Chart

The third node shows the proportion of WCA revenues that are spent on personnel services vs. other expenditures



First Alternative: The Sankey Chart

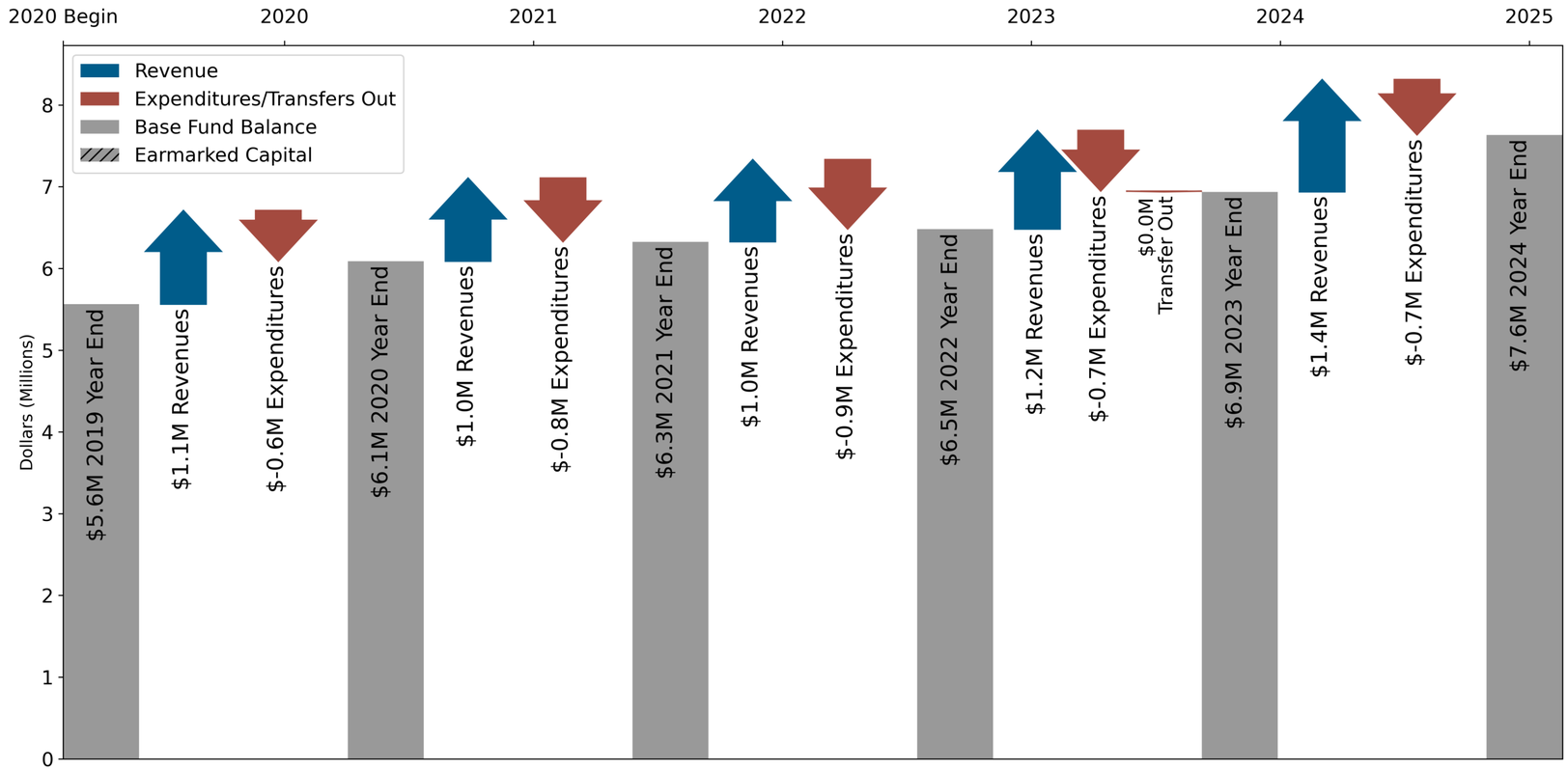
The final node shows ending fund balances, total expenditures, and budget sweeps out of our general fund.



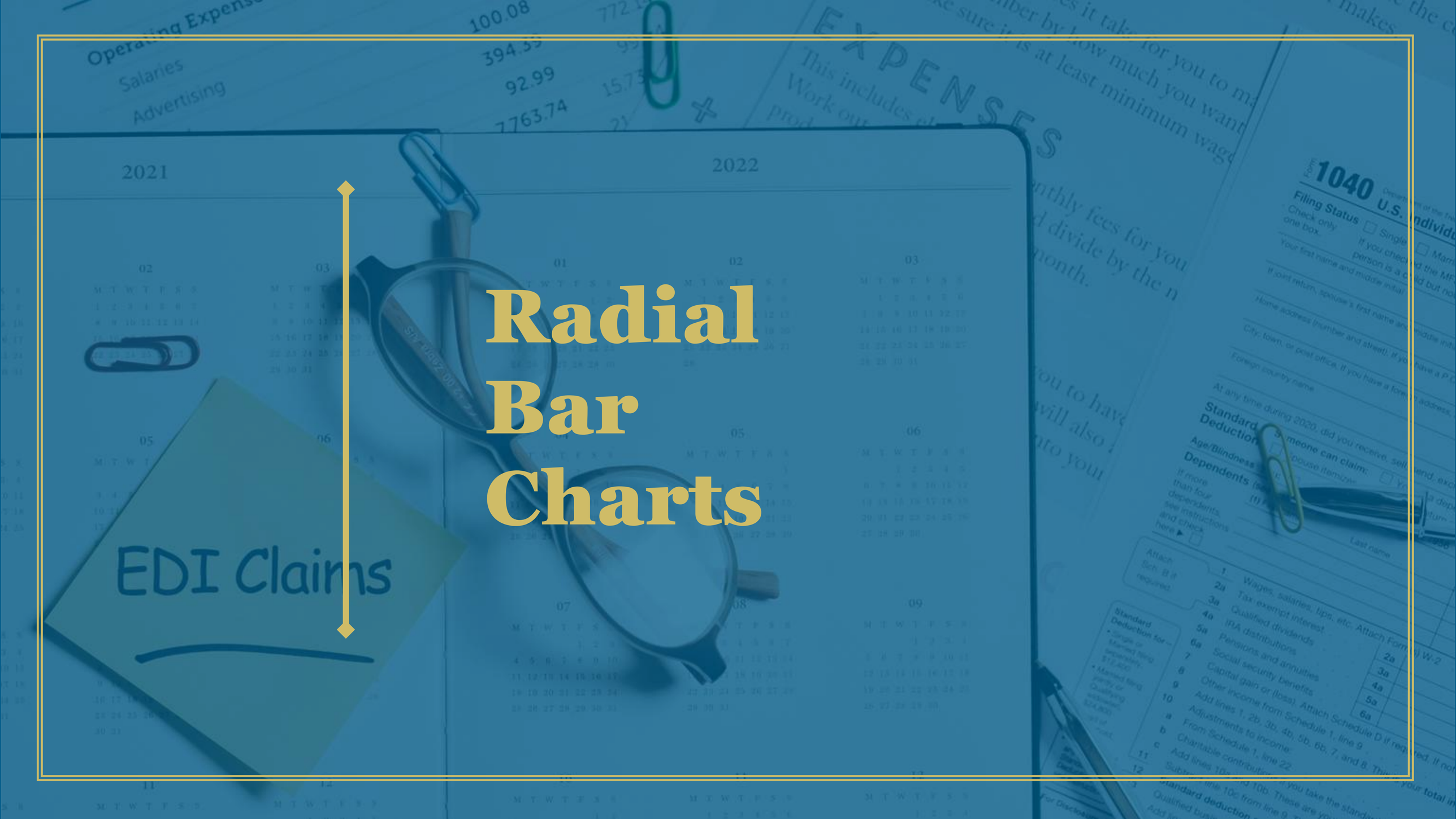
Second Alternative: The Waterfall Chart

What are they for?

Waterfall charts show how a starting value changes over time through increases and decreases. They highlight how revenues and expenditures shape fund balances across multiple years, making important financial trends easier to interpret than more detailed flow charts.



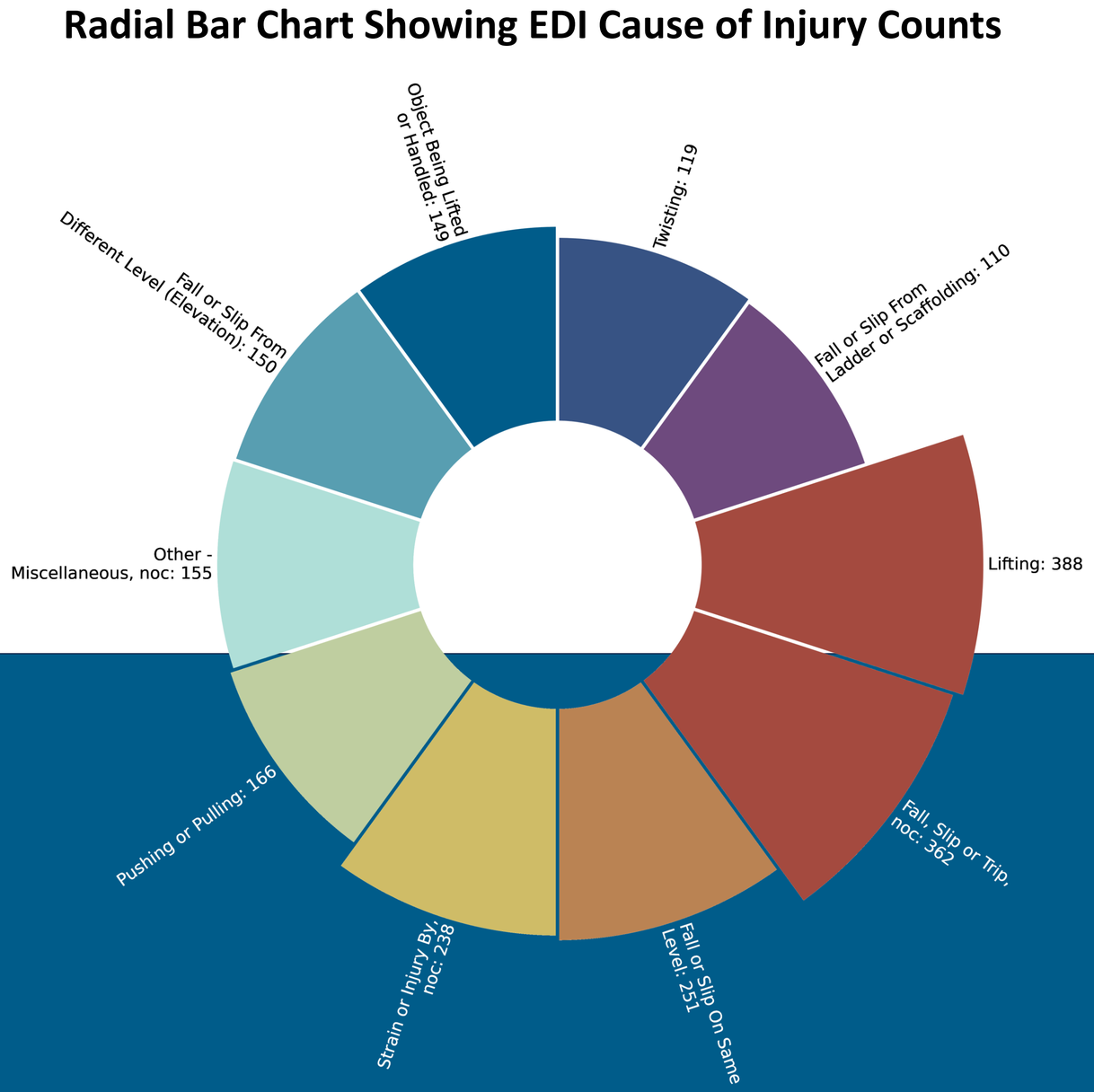
Radial Bar Charts



Radial Bar Charts

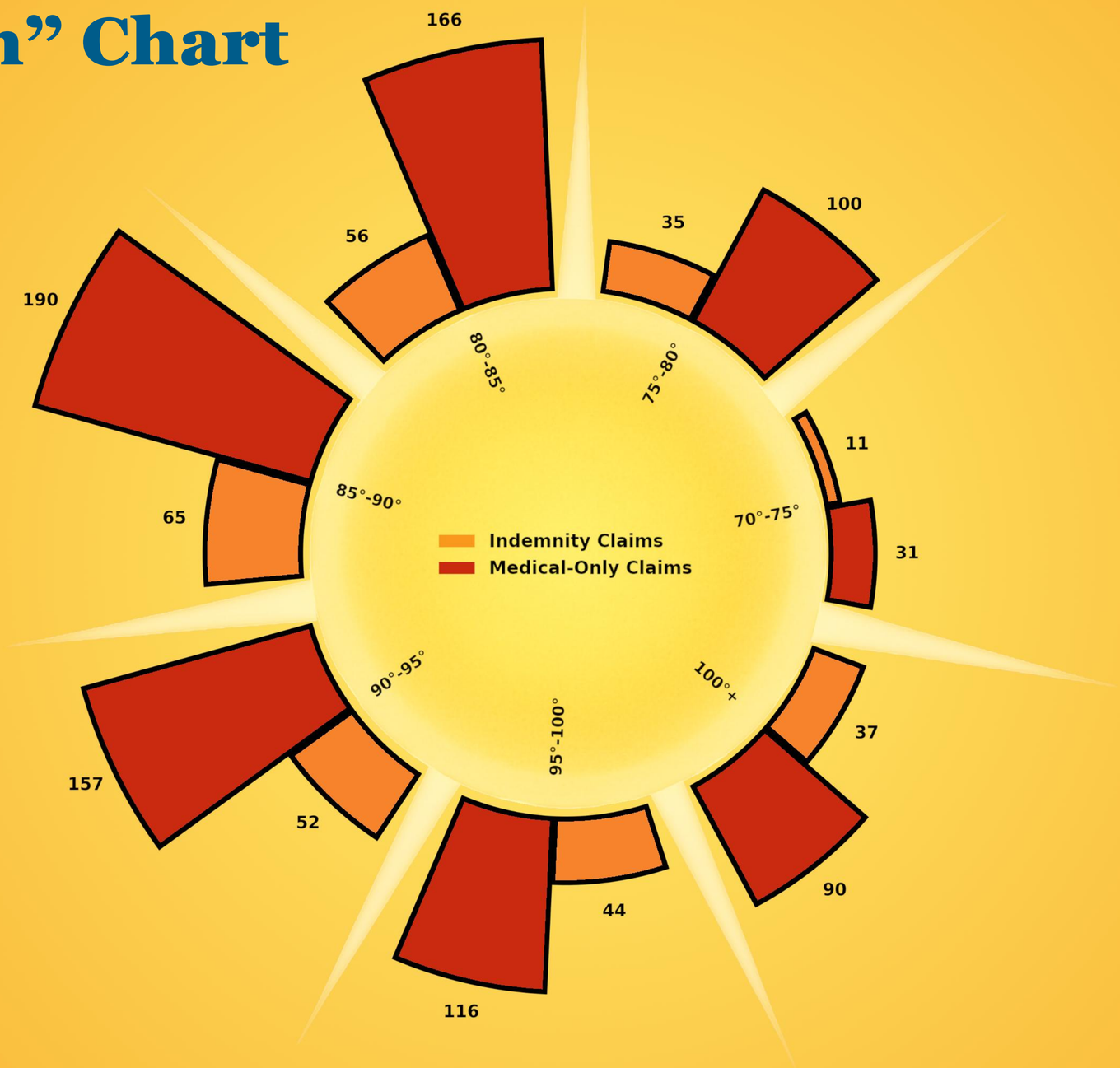
Radial bar charts serve the same function as a bar chart but can offer a more visually distinct appearance for design purposes.

They are generally worse at conveying information than a standard bar chart. However, this can be acceptable if the conclusions are obvious and you want to draw attention to the chart.



Radial “Sun” Chart

While somewhat difficult to read, this chart provides an interesting thematic visualization that ties into the purpose of the chart itself

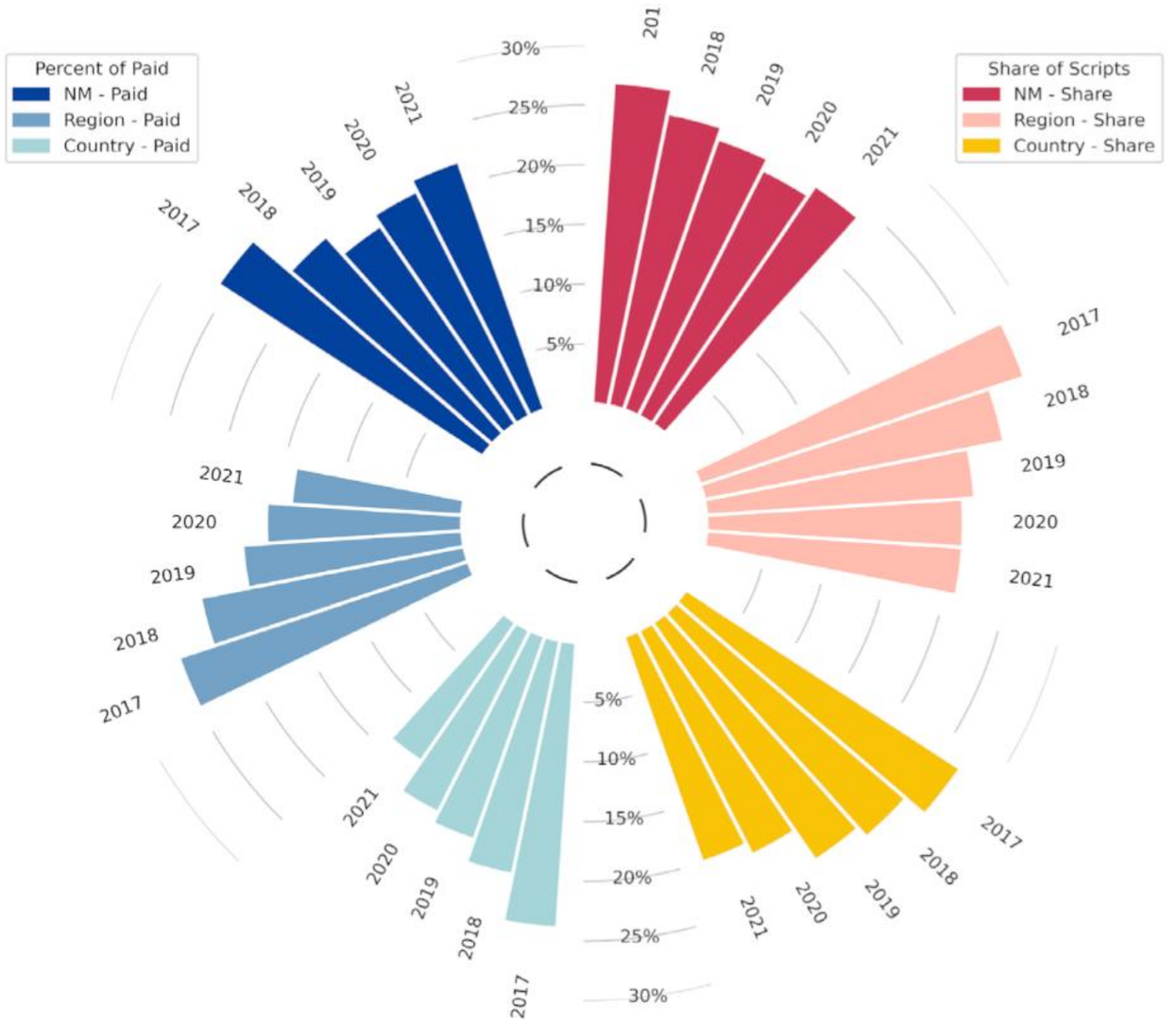


Analytical clarity is sacrificed for thematic coherence and engagement. This chart would be easier to read as a standard cluster bar chart but draws the eye and attention to the subject matter.

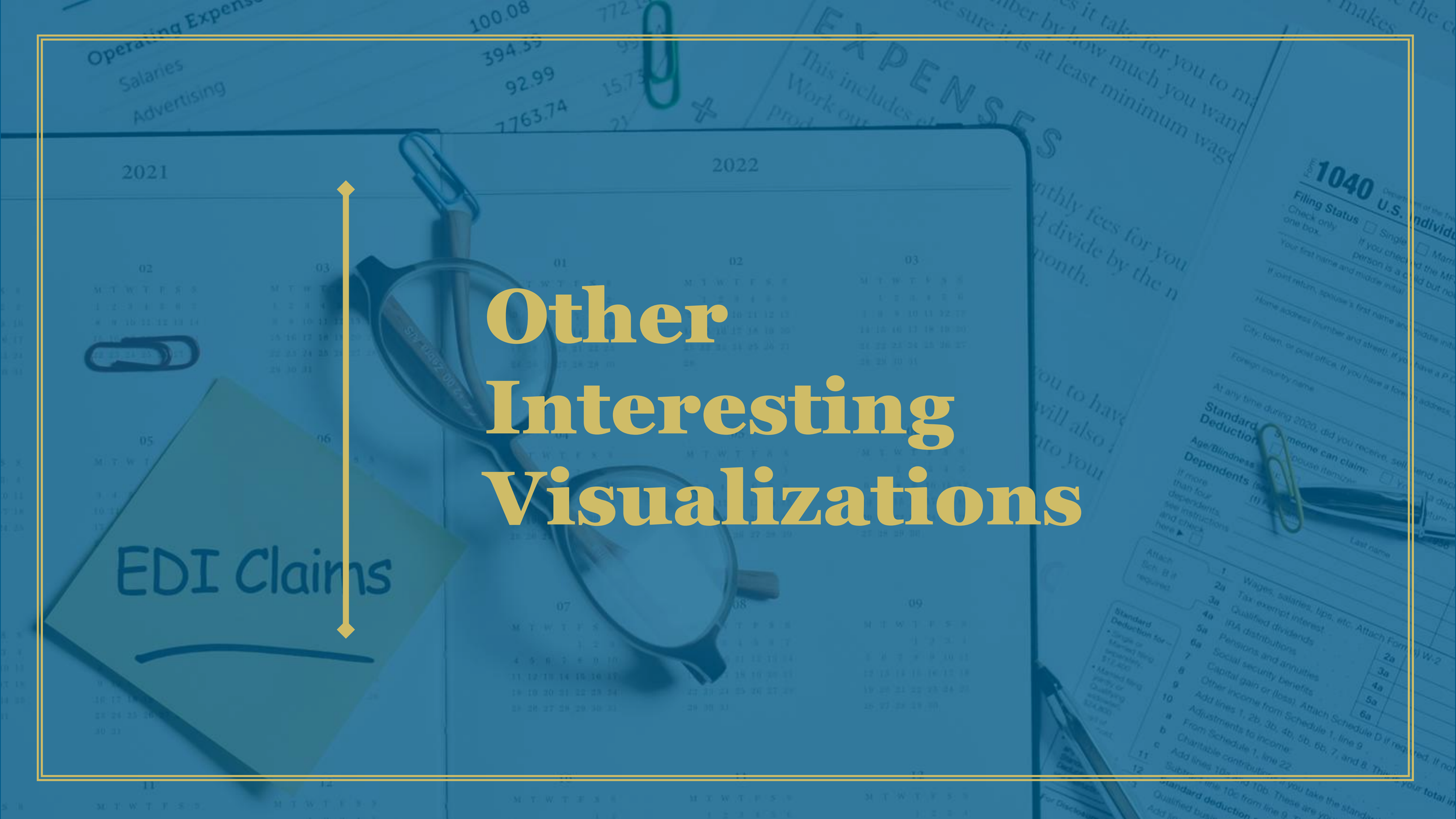
Radial Bar Chart Showing Injury Rates for Different Temperature Ranges

“Poppy” Chart for Opioid Rates

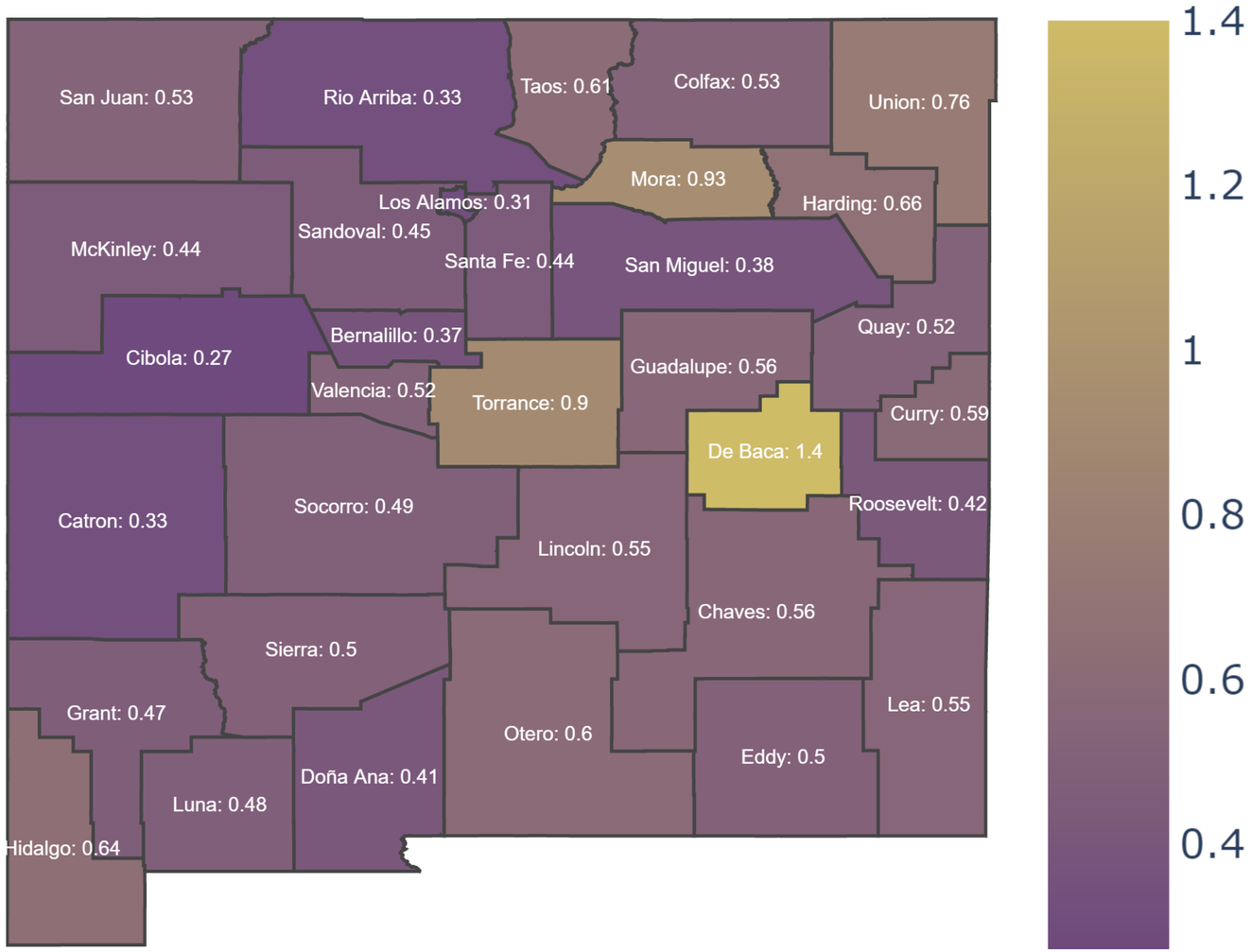
This chart uses a thematic “poppy” design to visually reinforce the subject of opioid use. While engaging and memorable, it is less effective than a standard bar chart for precise comparison and should be used primarily for storytelling rather than detailed analysis.



Opioids as a Percentage of Pharmaceuticals by State, Region, and Nation


Other
Interesting
Visualizations
EDI Claims

The Choropleth

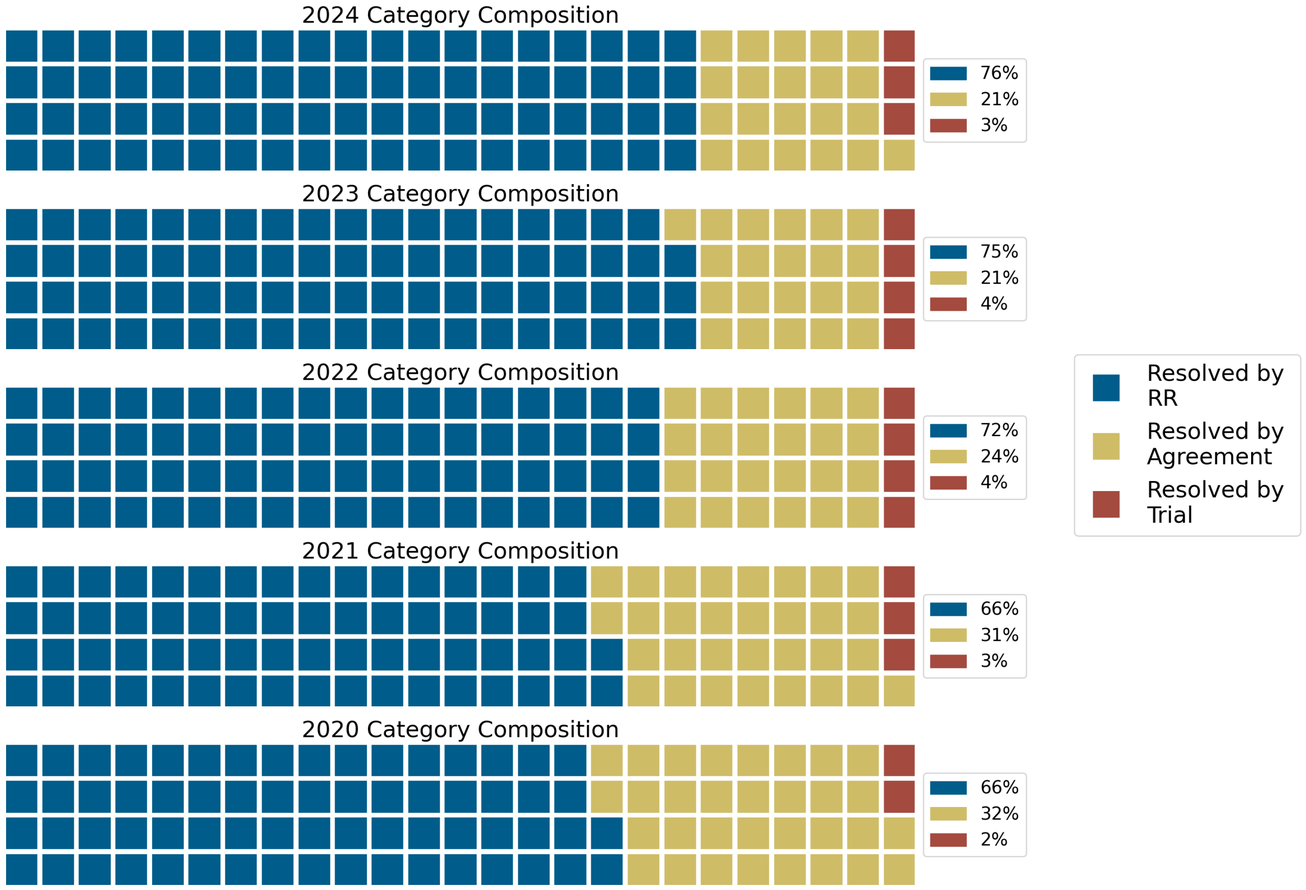


Useful for Geographic Claims Data

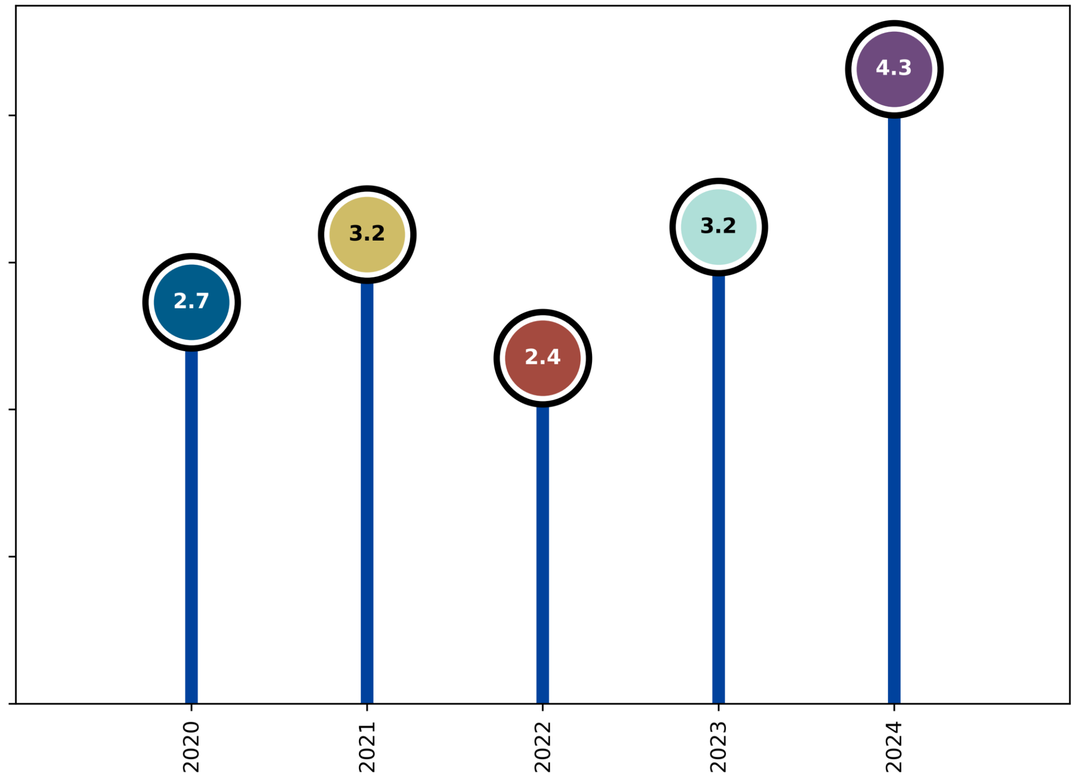
Choropleths use color to show how data varies across geographic regions, making spatial patterns easy to see. They are useful for identifying regional differences in injury rates or claim cost. Use caution when considering areas with small sample sizes.

Bar Charts in Disguise

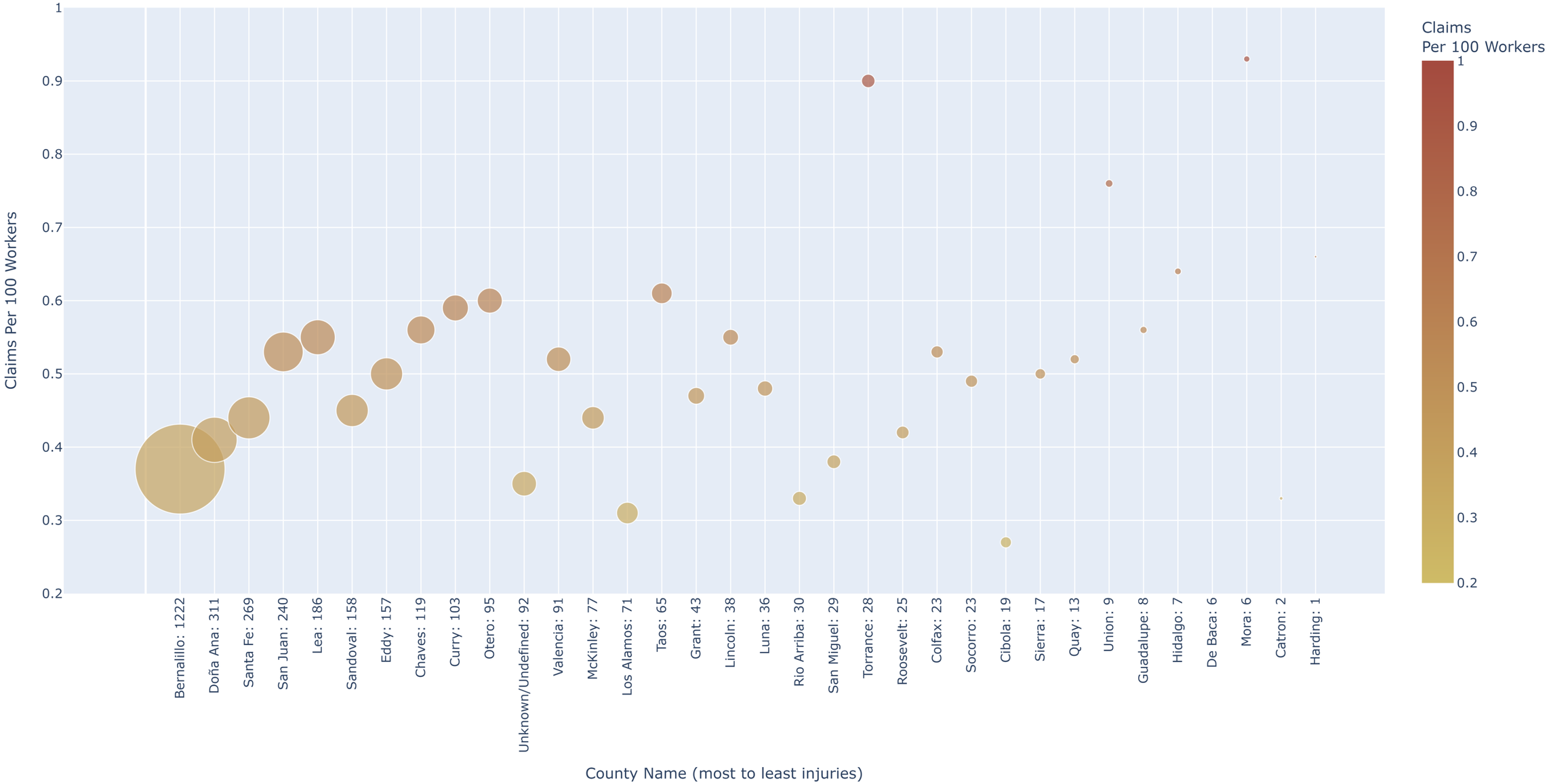
Waffle Chart



Lollipop Chart



Bubble Charts



Contact Information

Charles Cordova
Senior Economist
2410 Centre Ave. SE
Albuquerque, NM 87106
Phone: (505) 629-6300
Email: charles.cordova@wca.nm.gov

Seth Boateng
Senior Data Analyst
2410 Centre Ave. SE
Albuquerque, NM 87106
Phone: (505) 629-7127
Email: seth.boateng@wca.nm.gov