



Key Findings

- Between 2016-2020, Montanans with DRD spent \$4.5 million in ED visits. Conditions of the circulatory system accounted for the single largest proportion of reasons for these ED visits among Montanans (15%).
- Medicare was the largest payer for these ED visits, covering 62% of dollars spent.
- Nearly one in sixteen (6%) ED visits by patients with DRD were for conditions of the eyes or conditions of the endocrine, nutritional, and metabolic system.
- Patients with type 2 diabetes made up the majority (72%) of discharges with DRD.
- The rate of ED visits with mention of DRD by persons with type 1 diabetes (3,004 cases per 100,000 visits) was nearly 5 times higher than the rate of DRD ED visits by persons with type 2 (649 per 100,000).
- Patients aged 65 years or older accounted for 45% of emergency department visits made by patients with DRD.

Diabetes-related Retinal Disease (DRD) in Montana, 2016-2020

Diabetes-related retinal disease is a sight-threatening complication of diabetes as a result from high blood glucose levels damaging small blood vessels in the eyes.¹ Between 2016-2020, **Montanans with DRD spent over \$4.5 million on emergency department visits.**² Treatment options include medical injections, laser treatment or eye surgery, however the disease can be prevented by keeping blood sugar levels in a healthy range and getting regular eye exams to screen for damage to your retinas.¹ In 2019, **over one in four (28%) Montana adults with diabetes reported that they have not had a dilated eye exam in the past year.**³ This report summarizes emergency department (ED) visits in Montana featuring DRD from 2016 to 2020.

Best Practices for the General Public

- Talk to a licensed healthcare provider to determine your risk and status for diabetes and prediabetes.
- National Diabetes Prevention Programs (DPP) are available around the state for people who have been told they have prediabetes and are at risk of developing diabetes. To find a program near you visit [Montana's Diabetes Prevention Program webpage](#).

Best Practices for People Living with Diabetes

- Enroll in an accredited or recognized diabetes self-management education and support (DSMES) program. To find programs available near you, visit [Montana's Diabetes Self-Management Education and Support webpage](#).
- Get regular dilated eye exams to monitor for any damage to the eyes and discuss vision changes with your healthcare provider.
- Engage in regular activities for diabetes management and monitoring, including monitoring your blood sugar, keeping your blood pressure under control, and quitting tobacco if you use it.

Best Practices for Healthcare Providers

- Screen for and monitor DRD according to the [American Diabetes Association standards of care for diabetes](#).
- When DRD is found, direct patients to an eye care professional.

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Data

The data are from the Montana Hospital Discharge Data System (MHDDS) and include Emergency Department visits from January 1, 2016 to December 31, 2020. MHDDS collects data on approximately 90% of Emergency Department visits in Montana. ED visits in this report do not represent individual cases. The MHDDS does not contain individual identifiers and cannot be deduplicated. Only visits to EDs in Montana made by patients with a Montana county of residence were considered.

Visits featuring DRD were defined as ED discharges with a DRD ICD-10CM code included as either the principal reason for admission or as a secondary code. Appendix A describes the ICD-10-CM codes used in this report.

There were over 1.4 million ED visits between 2016 and 2020. Within this sample, 985 had a DRD related discharge code (Table 1).

Table 1: There were 985 ED visits with DRD out of over 1.4 million visits from 2016-2020.

Features	All ED visits (Total=1,434,708)	ED visits with DRD (Total=985)
Female	767,876 (54%)	490 (50%)
Male	666,779 (46%)	495 (50%)
Age 0-17 years	251,494 (18%)	1 (<1%)
Age 18-44 years	546,286 (38%)	176 (18%)
Age 45-64 years	326,897 (23%)	368 (37%)
Age 65 or more years	310,031 (22%)	440 (45%)
Type 1 diabetes	9,187 (1%)	276 (28%)
Type 2 diabetes	109,034 (8%)	708 (72%)
Other diabetes	525 (<1%)	1 (<1%)
Medicare	332,825 (23%)	142 (14%)
Medicaid/ other government insurance	358,711 (25%)	609 (62%)
Commercial insurance	576,220 (40%)	194 (20%)
Other/ Unknown insurance	166,900 (12%)	40 (4%)
Discharged in 2016	283,747 (20%)	151 (15%)
Discharged in 2017	292,696 (20%)	183 (19%)
Discharged in 2018	293,013 (20%)	232 (24%)
Discharged in 2019	298,120 (21%)	210 (21%)
Discharged in 2020	266,147 (19%)	209 (21%)



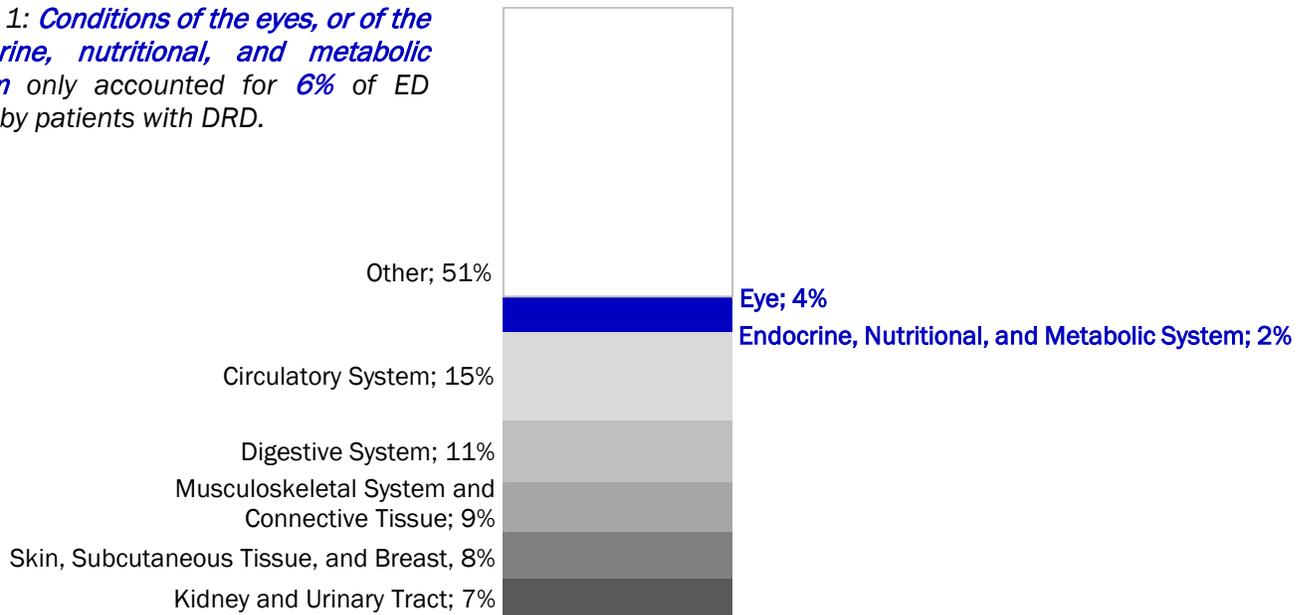
Results

The overall rate of ED visits with DRD was 53 per 100,000 visits in 2016 and 78 per 100,000 in 2020.

Reasons for Emergency Department Visit

There were 985 ED visits featuring DRD between 2016-2020. Among these visits, 713 (72%) had a recorded major diagnostic code to classify the reason for visit based on the principal diagnosis. Although DRD may result in emergency situations to preserve eyesight, most (96%) visits were for other reasons. The most common reasons were related to the circulatory system (15%), digestive system (11%), musculoskeletal system and connective tissue (9%), skin, subcutaneous tissue, and breast (8%), and kidneys and urinary tract (7%). Although diabetes is a condition of the endocrine system, principal diagnoses of the endocrine, nutritional, and metabolic system only accounted for 2% of cases, and conditions of the eyes accounted for 4% of cases (Figure 1).

Figure 1: *Conditions of the eyes, or of the endocrine, nutritional, and metabolic system* only accounted for **6%** of ED cases by patients with DRD.

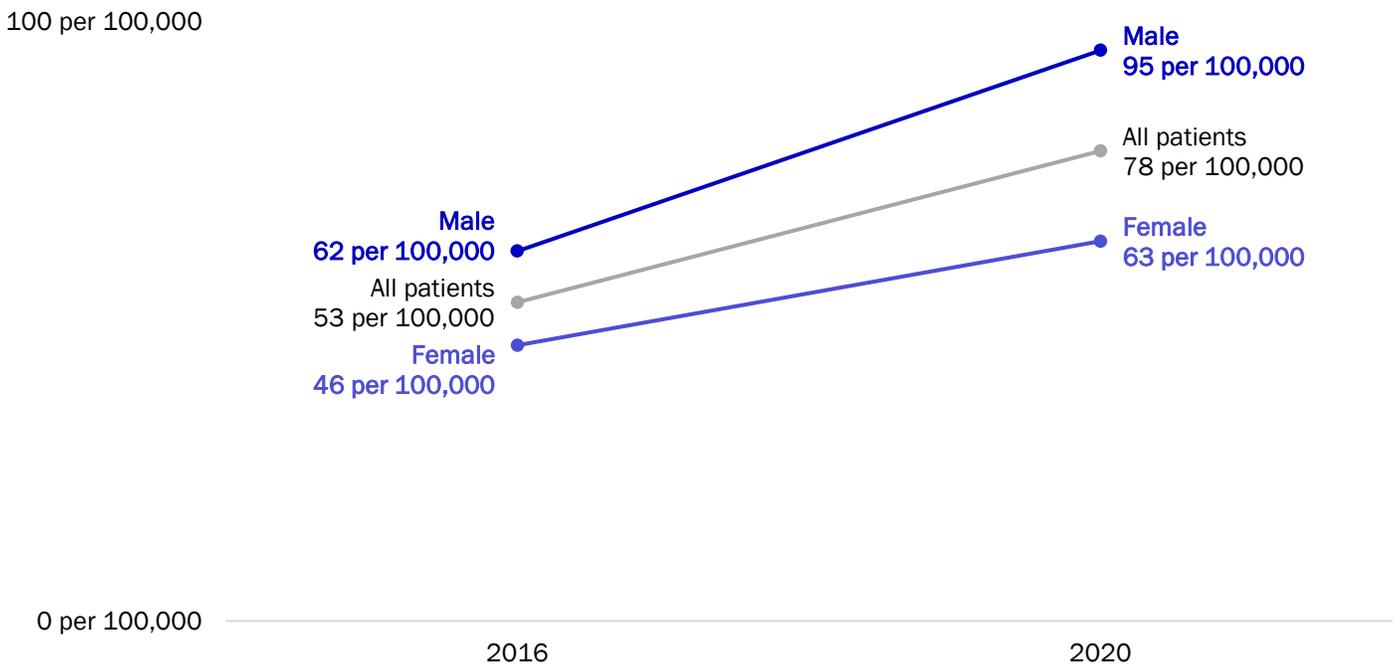


Sex

Among all ED visits with DRD, there was no significant difference in the proportion of patients who identified as female (50%) or male (50%). These sexes represented all visits with DRD.

The rate of ED visits with DRD was higher among men, starting at 62 per 100,000 ED visits in 2016 and increasing to 95 per 100,000 ED visits in 2020. The rate for females started at 46 per 100,000 ED visits in 2016 and increased to 63 per 100,000 ED visits in 2020 (Figure 2).

Figure 2: *Male patients* experienced a *higher rate of ED visits with DRD* from 2016-2020 than *female patients*.

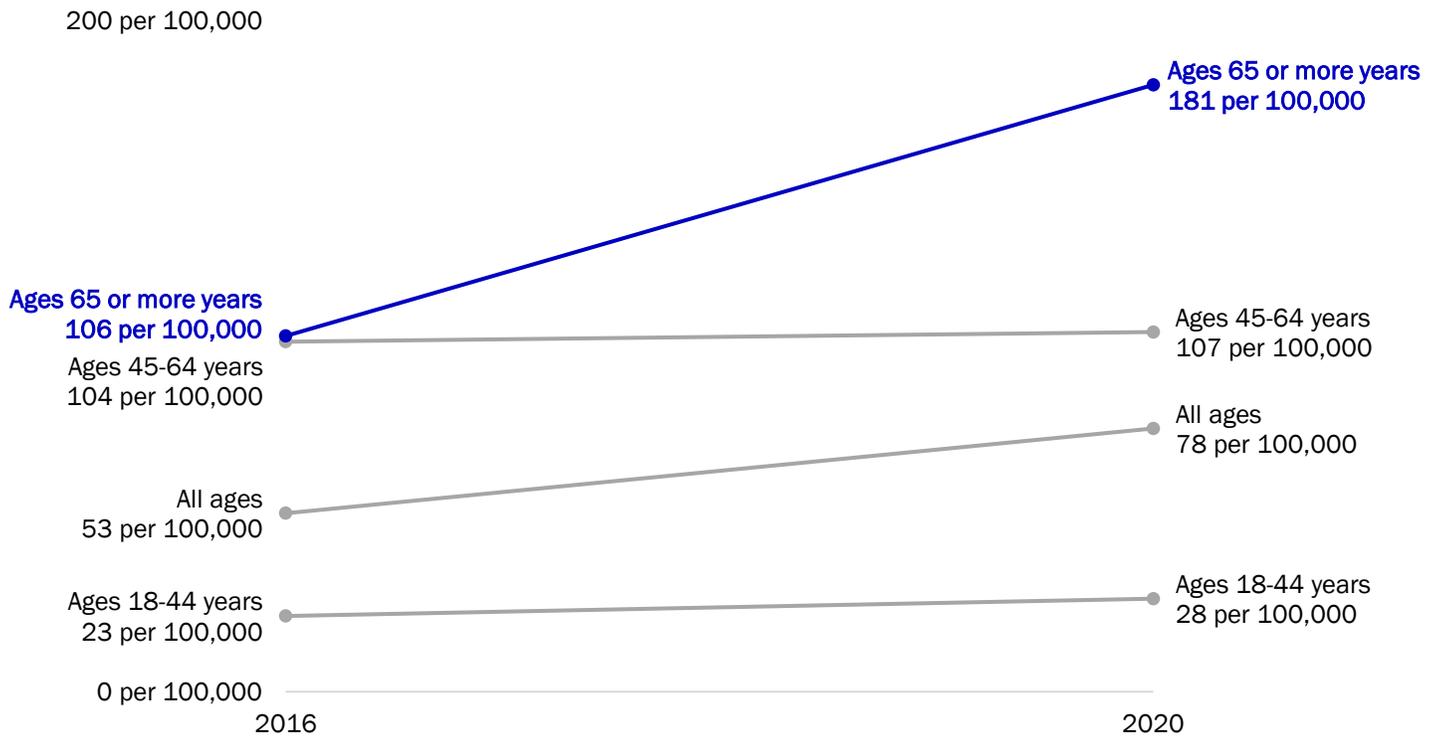




Age Group

Patients aged 65 years or older accounted for 45% of visits with DRD between 2016-2020. The rate of DRD among patients in this age group increased from 106 per 100,000 ED visits in 2016 to 181 per 100,000 visits in 2020; this was the only age group to experience a significant change ($p < 0.05$, Figure 3). Patients between the ages of 45-64 years accounted for 37% of cases; patients between the ages of 18-44 years accounted for 18% of cases. Although cases occurred among patients between the ages of 0-17 years, the rarity of this was too low for reporting.

Figure 3: *Patients aged 65 years and older* experienced the *greatest increase in ED visits involving DRD* from 2016-2020.





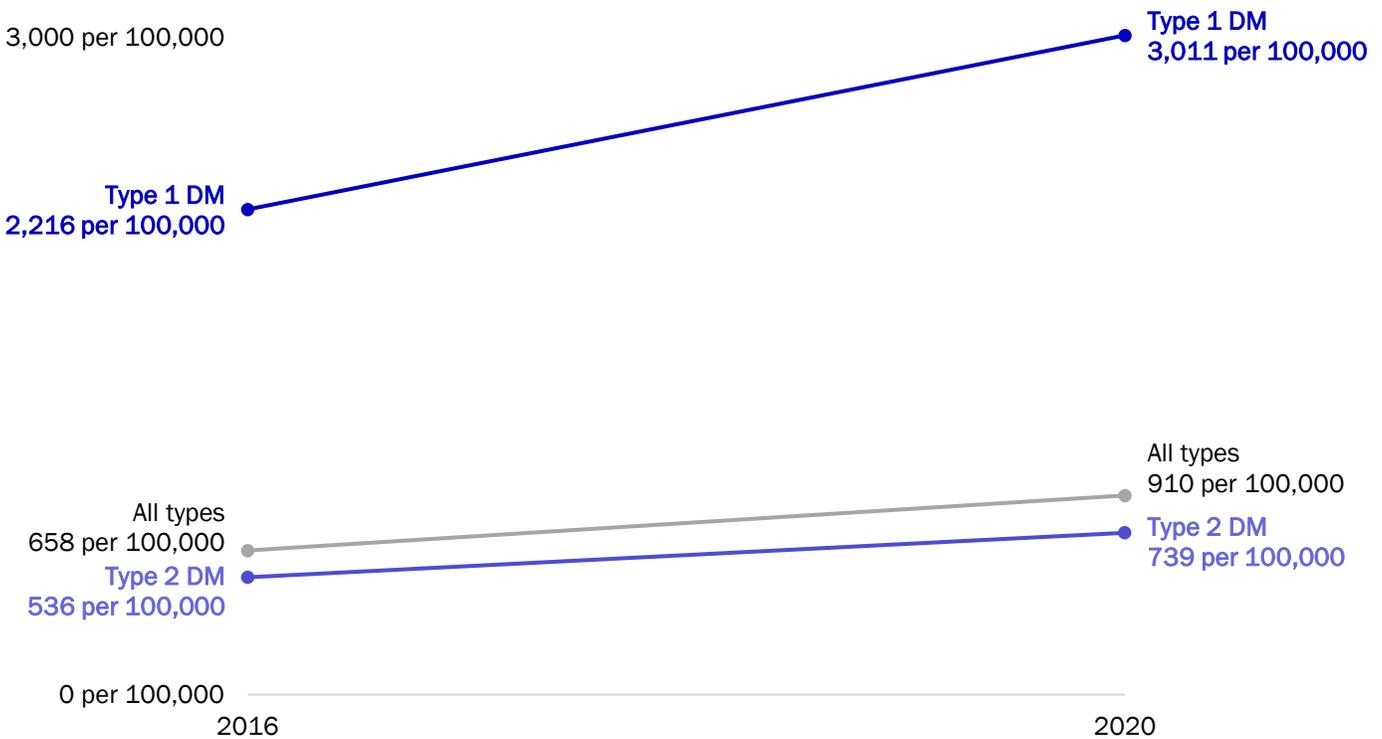
Type of Diabetes

There were 118,746 ED visits with diabetes mellitus (DM, 8% of all ED visits). The most common form of diabetes encountered was type 2 diabetes (92% of all ED visits with diabetes), followed by type 1 diabetes (8% of all ED visits with diabetes). While other forms of diabetes were observed, these accounted for less than 1% of all ED visits with diabetes. This includes diabetes related to underlying conditions, chemically induced diabetes, and unspecified diabetes. Gestational diabetes is not included in these numbers because there are no discharge codes regarding DRD specific to gestational diabetes.

Over one in four (28%) ED visits by patients with DRD had type 1 diabetes. In 2016, DRD was observed in 2,216 out of every 100,000 ED visits made by patients with type 1 diabetes. In 2020 this increased to 3,011 per 100,000 ED visits (Figure 4).

Among DRD ED visits, most (72%) had type 2 diabetes. The rate of ED visits with DRD among visits with type 2 diabetes increased from 536 per 100,000 ED visits in 2016 to 739 per 100,000 ED visits in 2020.

Figure 4: *DRD occurred in ED visits by patients with type 1 diabetes four times more often than visits by patients with type 2 diabetes.*

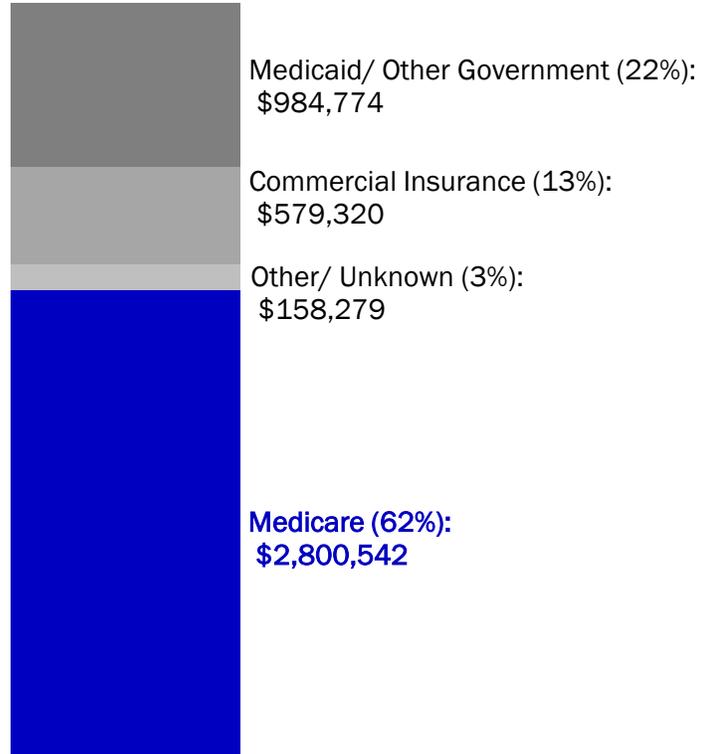




Payer: Cost

Insurance companies and self-pay patients with DRD were charged over \$4.5 million between 2016-2020 for ED visits in Montana. Medicare paid the largest proportion of this, being charged over \$2.8 million (Figure 5). The median charge for all years combined was \$2,832. Medicaid and other government insurance had the highest average charge with a median of \$3,063; the median charge for patients with Medicare was \$2,783; for patients with commercial insurance, it was \$2,629; for patients with other insurance or unknown insurance it was \$2,981.

Figure 5: **Medicare accounted for 62% of dollars spent** on ED visits where DRD was mentioned.





Payer: ED Visits

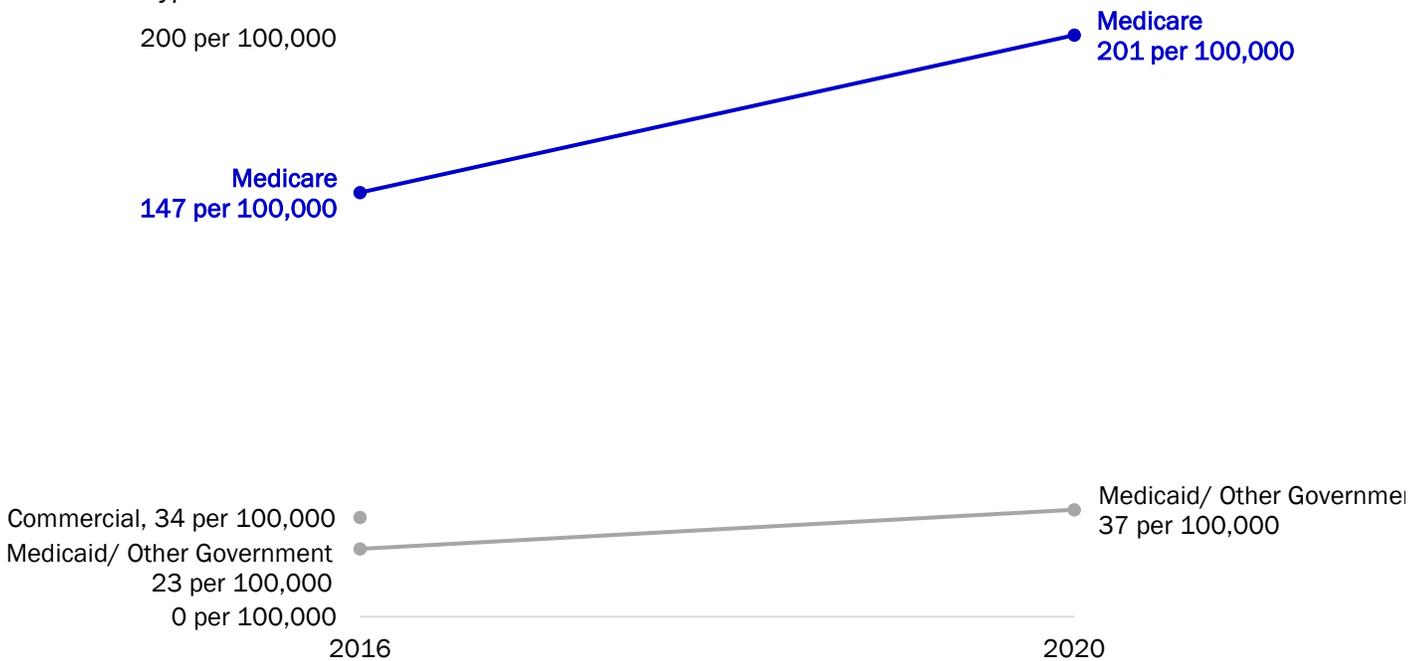
Between 2016-2020, Medicare paid for 62% of ED visits with DRD. The rate of DRD occurring among patients discharged from the ED covered by Medicare increased from 147 per 100,000 ED visits in 2016 to 201 per 100,000 ED visits in 2020 (Figure 6).

Medicaid and other government insurance paid for 20% of ED visits with DRD. The rate of DRD among ED visits by patients with this type of insurance increased from 23 cases per 100,000 in 2016 to 37 cases per 100,000 in 2020.

Patients with commercial insurance made up 14% of ED visits with DRD. The rate of DRD among ED visits by patients with commercial insurance was 34 cases per 100,000 ED visits in 2016. Due to low ED utilization in 2020, the rate cannot be reliably reported for comparison.

Patients with unknown insurance, other insurance, or no insurance represented 4% of ED visits with DRD. Annual representation of this group was too low to report for year-by-year comparison.

Figure 6: Patients with **Medicare had the highest rate of ED visits where DRD was observed** compared to any other insurance type.





Discussion

Diabetes-related retinal disease is both preventable and treatable. These data emphasize the prevalence of DRD among Montanans seeking emergency care for any reason. The effects of chronic diseases, such as diabetes, often require an accumulation of time before they begin negatively impacting people’s lives. This is reflected in the rate of DRD being higher among ED visits made by patients aged 65 years or older and patients with Medicare. While vision decline with age is often expected, patients with diabetes should be aware of this additional risk and of their treatment and prevention options. Montana has many options for patient education and support for people living with diabetes and those interested in reducing their risk or preventing diabetes.

These data are cross sectional and therefore cannot assign causation of DRD; findings should not be interpreted to indicate an increased risk among subpopulations. Additionally, changes in ED utilization during 2020 is known to be impacted by the COVID-19 pandemic and is reflected in both Montana’s ED data and data reported nationwide; amidst these impacts, many US adults reported forgoing care during the pandemic.⁴ This is the first report from Montana Department of Public Health and Human Services to monitor the presence of DRD among Montanans; future reports will provide better knowledge of this condition as data from later years becomes available.

References

1. National Eye Institute, National Institutes of Health. 2022. Diabetic retinopathy. Retrieved from <https://www.nei.nih.gov/learn-about-eye-health/eye-conditions-and-diseases/diabetic-retinopathy>.
2. Montana Hospital Discharge Data System. 2016-2020. Office of Epidemiology and Scientific Support, Public Health and Safety Division. Montana Department of Public Health and Human Services. Data provided courtesy of participating MHA members.
3. Montana Department of Public Health and Human Services (MT DPHHS) and Centers for Disease Control and Prevention (CDC). Behavioral Risk Factor Surveillance System Survey (BRFSS) Data. 2019.
4. Anderson, KE., McGinty, EE., Presskreischer, R., Barry, CL. 2021. Reports of forgone medical care among US adults during the initial phase of the COVID-19 pandemic. JAMA Network Open, 4 (1). doi: 10.1001/jamanetworkopen.2020.34882

Appendix A: ICD-10-CM Codes Used

Records were flagged when a diagnosis code for DRD was found in the primary diagnosis field (first listed) or any secondary diagnosis field (listings 1-8).

Population	ICD-10-CM codes beginning with ...
Patients with diabetes	E08, E09, E10, E11, E13
Patients with diabetes-related retinal disease	E08.31-35; E09.31-35; E10.31-35; E11.31-35; E13.31-35

