Air Ambulance Services in the United States

A Study of Private and Medicare Claims

A FAIR Health White Paper, September 28, 2021
Summary

Rotary-wing (helicopter) or fixed-wing (airplane) air ambulances are sometimes used in emergencies to transport critically ill patients, often in life-threatening situations, to a hospital or for transportation between hospitals when patients need a higher level of care. In this report, FAIR Health uses both private and Medicare claims data to shed light on aspects of air ambulance services—both fixed-wing and rotary-wing—across the nation, including utilization, costs, age, gender, diagnoses that drive air ambulance use, differences across states, and outcomes of air ambulance transport as compared to ground ambulance transport. Among the findings:

- Air ambulance claim lines increased 30 percent from 2016 to 2020 as a percentage of all ambulance (ground and air) claim lines (0.7 percent in 2016 to 0.9 percent in 2020).
- From 2017 to 2020, average charges, estimated allowed amounts and Medicare reimbursements all increased for both fixed-wing and rotary-wing air ambulance transport.\(^1\)
  - The average charges associated with fixed-wing air ambulance transports rose 27.6 percent, from $19,210 in 2017 to $24,507 in 2020. The average estimated allowed amounts rose 76.4 percent, from $8,855 to $15,624. The average Medicare reimbursements rose 4.7 percent, from $3,071 to $3,216.
  - The average charges associated with rotary-wing air ambulance transports rose 22.2 percent, from $24,924 in 2017 to $30,446 in 2020. The average estimated allowed amounts rose 60.8 percent, from $11,608 to $18,668. The average Medicare reimbursements rose 4.7 percent, from $3,570 to $3,739.
- In the period 2016-2020, air ambulance claim lines were predominantly associated with individuals 65 years and older. Patients in that age group accounted for 55.4 percent of claim lines for fixed-wing transport and 63.6 percent of claim lines for rotary-wing transport.\(^2\)
- The top diagnoses associated with fixed-wing air ambulance rides from 2016 to 2020, as attributed by ambulance providers, were (from most to least common) digestive system issues; heart attack; sprains, strains, breaks and fractures; chronic respiratory diseases; and general signs and symptoms involving the circulatory and respiratory systems.
- The top diagnoses associated with rotary-wing air ambulance rides from 2016 to 2020 were cerebrovascular issues and diseases, heart attack, head injury, injury to body and stroke.
- The states with the highest use of fixed-wing air ambulance transport as a percentage of all medical claim lines in that state in 2020 (in order from highest to lowest use) were Alaska, Wyoming, South Dakota, Montana and New Mexico. The five states with the lowest use (in order from lowest to highest use) were Virginia, Kentucky, New Hampshire, New Jersey and Vermont.\(^3\)
- Based on the origination point of the flight, the states with the highest average mileage for fixed-wing air ambulance transport in 2020 were Alaska (455 miles), Florida (444 miles), Georgia (429 miles), North Carolina (401 miles) and Indiana (382 miles).
- The states with the highest use of rotary-wing air ambulance transport as a percentage of all medical claim lines in that state in 2020 were Idaho, South Dakota, New Mexico, West Virginia and Wyoming.
- The states with the highest average mileage for rotary-wing air ambulance transport in 2020 were Hawaii (126 miles), North Dakota (115 miles), Wyoming (110 miles), Nebraska (94 miles) and New Mexico (90 miles).
- In emergencies, in the period 2016-2020, patients transported by air ambulance were much more likely to be admitted as inpatients to a hospital than patients transported by ground ambulance.

\(^1\) Costs shown here are for base fees only and do not include mileage fees.
\(^2\) Because FAIR Health data include 100 percent of the Medicare Fee-for-Service population but not 100 percent of the privately insured population, this may affect age-related results.
\(^3\) The states with the lowest use do not include Rhode Island and Delaware, which had no utilization of fixed-wing air ambulance services.
In the period 2016-2020, the diagnosis with the highest inpatient admission rate after a fixed-wing air ambulance transport was newborn disorders. The diagnosis with the highest inpatient admission rate after a rotary-wing air ambulance transport was complications in newborns.

Background

Rotary-wing (helicopter) or fixed-wing (airplane) air ambulances are sometimes used in emergencies to transport critically ill patients, often in life-threatening situations, to a hospital or for transportation between hospitals when patients need a higher level of care. Patients generally have no control over whether to use an air ambulance or which air ambulance provider to use. Therefore, surprise or balance bills—in which a patient is billed for out-of-network emergency services or for nonemergency services unexpectedly rendered by an out-of-network provider at an in-network facility—occur frequently with air ambulance services. As a result, though they affect relatively few people, air ambulance services have been the subject of substantial policy focus.

A number of states have attempted to regulate air ambulance charges; such attempts, however, have frequently been overturned by court rulings that state efforts to regulate air ambulance rates are preempted by the Airline Deregulation Act of 1978. On the federal level, the No Surprises Act, signed into law in December 2020 as part of the Consolidated Appropriations Act of 2021, contains provisions to protect consumers from surprise bills, including balance bills from out-of-network air ambulance service providers. The No Surprises Act also authorizes states to enforce certain provisions of the No Surprises Act with respect to air ambulance providers.

Despite the policy importance of air ambulances, there have been relatively few in-depth studies of the use of air ambulance services. Using FAIR Health data, the US Government Accountability Office conducted a study that focused on financial aspects, showing that 69 percent of air ambulance transports were out of network in 2017. Other studies have been limited in scope to a single rural burn center or focused only on rotary-wing transports. In this report, FAIR Health is able to use its rich data to shed light on many aspects of air ambulance services—both fixed-wing and rotary-wing—across the nation, including utilization, costs, age, gender, diagnoses triggering air ambulance services, differences across states, and outcomes of air ambulance transport as compared to ground ambulance transport.

A national, independent nonprofit organization dedicated to bringing transparency to healthcare costs and health insurance information, FAIR Health possesses a repository of over 35 billion private healthcare claim records—the largest in the nation. In addition to drawing on this database, which includes Medicare Advantage enrollees, FAIR Health analyzed the Medicare Fee-for-Service data it receives from the Centers for Medicare & Medicaid Services (CMS) pursuant to the Qualified Entity (QE) Program.

Some of the findings in this report are also available in the form of two infographics, the first on **growth, costs and geography**, the second on **demographics and diagnoses**.

### Methodology

FAIR Health retrieved both longitudinal and non-longitudinal claim lines\(^9\) from its private insurance dataset, as well as Medicare claim lines, with dates of service in the period 2016-2020, that had a procedure code indicating air ambulance service:

- A0430, ambulance service, conventional air services, transport, one way (fixed wing); and
- A0431, ambulance service, conventional air services, transport, one way (rotary wing).

FAIR Health evaluated the data as a percentage of all ambulance services in that period, including air and ground. Ground ambulance services include, for example, A0428, ambulance service, basic life support, nonemergency transport (BLS), and A0998, ambulance response and treatment, no transport.

FAIR Health analyzed the data by such factors as costs, age, gender, diagnoses, utilization by state and mileage by state.

In addition, using its longitudinal data, FAIR Health followed a cohort of patients who had used three different types of emergency ambulance: fixed-wing and rotary-wing air ambulance, as well as ground ambulance—emergency. By evaluating claims for the same day as well as two days after their index ambulance date, FAIR Health determined whether the patients had an emergency room visit with no follow-up admission to a hospital, or whether they were admitted to a hospital from the emergency room.

Ground ambulance—emergency includes the following procedure codes:

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A0426</td>
<td>Ambulance service, advanced life support, nonemergency transport, level 1 (ALS 1)</td>
</tr>
<tr>
<td>A0427</td>
<td>Ambulance service, advanced life support, emergency transport, level 1 (ALS 1-emergency)</td>
</tr>
<tr>
<td>A0428</td>
<td>Ambulance service, basic life support, nonemergency transport (BLS)</td>
</tr>
<tr>
<td>A0429</td>
<td>Ambulance service, basic life support, emergency transport (BLS-emergency)</td>
</tr>
<tr>
<td>A0433</td>
<td>Advanced life support, emergency transport (ALS 2)</td>
</tr>
</tbody>
</table>

### Limitations

This study is subject to certain limitations. The data used in this study include only private insurance claim records (including those of Medicare Advantage enrollees) and Medicare Fee-for-Service claim records. Therefore, the results may not be generalizable to those enrolled in other public insurance programs, such as Medicaid, or to the uninsured.

For its repository of private claims, FAIR Health does not obtain data from all private payors or third-party administrators but only those who have elected to participate in FAIR Health’s contractual data contribution program. However, those contributors include over 60 national and regional payors and third-party administrators who insure or process claims for private insurance plans, including fully insured and employer self-funded plans. In addition, as part of the requirements for being certified as a QE by CMS, FAIR Health demonstrated to CMS that FAIR Health’s private claims data were statistically representative of the populations in each of the 50 states and the District of Columbia.

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\(^9\) “Claim lines” are the individual procedures or services listed on an insurance claim.
Results

Growth

Air ambulance utilization grew steadily from 2016 to 2020 (figure 1). Air ambulance (fixed-wing and rotary-wing) claim lines increased each year from 2016 to 2020 as a percentage of all ambulance (ground and air) claim lines. From 2016 to 2020, the increase was 30.3 percent.

Figure 1. Air ambulance claim lines as a percentage of all ambulance (ground and air) claim lines, 2016-2020
Throughout the period 2016-2020, claim lines for rotary-wing aircraft had a greater share of the air ambulance market than fixed-wing air ambulance claim lines (figure 2). But the percentage of fixed-wing air ambulance claim lines as a share of all air ambulance claim lines increased each year, from 15.9 percent in 2016 to 21.9 percent in 2020—an increase of 38.17 percent.

Figure 2. Fixed-wing versus rotary-wing air ambulance claim lines as a percentage of all air ambulance claim lines, 2016-2020
Costs

Air ambulance costs include an initial or base fee and a mileage fee, or the mileage rate multiplied by the miles per trip. Figure 3 shows the average base fees, without mileage fees, for fixed-wing and rotary-wing air ambulances from 2017 to 2020 in terms of charge amounts, estimated allowed amounts and Medicare reimbursement amounts. All types of values for both types of air ambulance increased.

The average charges associated with a fixed-wing air ambulance rose 27.6 percent from $19,210 in 2017 to $24,507 in 2020. The average estimated allowed amounts rose 76.4 percent from $8,855 to $15,624. The average Medicare amount rose 4.7 percent from $3,071 to $3,216.

The average charges associated with a rotary-wing air ambulance rose 22.2 percent from $24,924 in 2017 to $30,446 in 2020. The average estimated allowed amounts rose 60.8 percent from $11,608 to $18,668. The average Medicare amount rose 4.7 percent from $3,570 to $3,739.

Figure 3. Average charge amounts, estimated allowed amounts and CMS (Medicare reimbursement) amounts for fixed-wing and rotary-wing air ambulance, without mileage fees, 2017-2020

11 A charge amount is the amount charged to a patient who is uninsured or obtaining an out-of-network service.
12 An allowed amount is the total fee negotiated between an insurance plan and a provider for an in-network service; the allowed amount includes both the insurer’s and the member’s share of the total fee. Because payors’ contracted network rates are proprietary, FAIR Health employs an imputation methodology to determine benchmarks for allowed amounts. First, FAIR Health calculates the ratios of actual allowed amounts to charges for groups of procedure codes on a regional basis. The resulting ratios are applied to the actual charges for each specific procedure at the local (geozip) level to develop an “imputed” or “estimated” allowed amount for each claim line.
Age and Gender

In the period 2016-2020, air ambulance claim lines were predominantly associated with individuals 65 years and older (figure 4). Patients in that age group accounted for 55.4 percent of claim lines for fixed-wing transport and 63.6 percent of claim lines for rotary-wing transport. Individuals aged 51 to 64 accounted for 19.3 percent of the distribution for fixed wing, and 17.1 percent for rotary wing. However, the youngest group, individuals 0 to 18 years of age, were associated with higher air ambulance utilization (11.3 percent of fixed-wing claim lines, 7.1 percent of rotary-wing claim lines) than the next oldest group, that of individuals 19 to 35 (5.9 percent of fixed-wing claim lines, 5.1 percent of rotary-wing claim lines).

Figure 4. Distribution of claim lines for fixed-wing and rotary-wing air ambulance, by age group, 2016-2020
In the period 2016-2020, fixed-wing air ambulance transport was associated more with males than females in all age groups except for the age group 36 to 50 years (figure 5). Gender disparity varied by age group. Pediatric patients (ages 0 to 18) were 1.6 times as likely to be male as female; individuals aged 51 to 64 were 1.8 times as likely to be male.

Figure 5. Distribution of fixed-wing air ambulance claim lines by age and gender, 2016-2020
Rotary-wing air ambulance transport was associated more with males than females in all age groups in the period 2016-2020 (figure 6). Claim lines for the services were submitted approximately 1.5 times more frequently for males than females in all age groups except that of individuals 65 years and older, for which they were submitted 1.2 times more frequently.

Figure 6. Distribution of rotary-wing air ambulance claim lines by age and gender, 2016-2020
Diagnoses

Figure 7 shows the most common diagnoses associated with fixed-wing air ambulance transport in the period 2016-2020, as attributed by ambulance providers. The most common diagnosis was digestive system issues, which includes gastrointestinal hemorrhage, unspecified; unspecified intestinal obstruction (unspecified as to partial versus complete obstruction); and intestinal perforation. Heart attack was the second most common, and the third was sprains, strains, breaks and fractures.

Figure 7. Most common diagnoses associated with fixed-wing air ambulance, 2016-2020
In 2020, the year the COVID-19 pandemic started in the United States, the most common diagnoses associated with fixed-wing air ambulance transport changed (figure 8). Unlike in the period 2016-2020 (figure 7), the most common diagnosis in 2020 was chronic respiratory diseases, including chronic obstructive pulmonary disease and chronic respiratory failure (with hypoxia and/or hypercapnia). The second most common diagnosis was COVID-19, accounting for seven percent of fixed-wing air ambulance claim lines. Of note also was the sharp decrease in claim lines associated with sprains, strains, breaks and fractures, which fell from third to eighth place.

Figure 8. Most common diagnoses associated with fixed-wing air ambulance, 2020
The mix of most common diagnoses for fixed-wing air ambulance transport was different in the age group 0 to 18 years (figure 9) from the overall patient population in the period 2016-2020 (figure 7). For individuals 0 to 18, head injury was the top diagnosis, accounting for 12 percent of fixed-wing air ambulance claim lines. Epilepsy and seizures were the second most common diagnosis, and (as for the overall population) sprains, strains, breaks and fractures were third. Signs and symptoms involving behavior and emotional state were the fourth most common, and burns and corrosions were fifth.

Figure 9. Most common diagnoses associated with fixed-wing air ambulance in the age group 0 to 18 years, 2016-2020
In the age group 19 to 35 (figure 10), two of the most common diagnoses for fixed-wing air ambulance transport were different from those in the overall patient population in the period 2016-2020 (figure 7). Abdominal and pelvic pain and tenderness, which include unspecified abdominal pain, were the third most common diagnosis associated with the age group 19 to 35, and complications of pregnancy were the fifth most common diagnosis. The age groups older than 35 were similar to the overall patient population.

Figure 10. Most common diagnoses associated with fixed-wing air ambulance in the age group 19 to 35 years, 2016-2020
The most common diagnosis associated with rotary-wing air ambulance transport in the period 2016-2020 was cerebrovascular issues and diseases, which include intracerebral hemorrhage, subarachnoid hemorrhage and other types of “brain bleeds” (figure 11). Heart attack was the second most common diagnosis associated with rotary-wing air ambulance transport, while head injury was the third.

Figure 11. Most common diagnoses associated with rotary-wing air ambulance, 2016-2020
The pediatric population (figure 12) had several differences from the general population (figure 11) in most common diagnoses associated with rotary-wing air ambulance transport in the period 2016-2020. Head injury was the most common diagnosis in the age group 0 to 18, accounting for 19 percent of all rotary-wing air ambulance claim lines, whereas it was third most common in the general population, accounting for 9 percent. Epilepsy and seizures were the third most common diagnosis in the age group 0 to 18.

Figure 12. Most common diagnoses associated with rotary-wing air ambulance in the age group 0 to 18 years, 2016-2020
Injury to body and head injury were by far the most common reasons for patient transport via a rotary-wing air ambulance in the age group 19 to 35 in the period 2016-2020 (figure 13). Approximately 43 percent of claim lines in this age group for this form of transport were associated with these diagnoses: 23 percent for injury to body and 20 percent for head injury.

**Figure 13.** Most common diagnoses associated with rotary-wing air ambulance in the age group 19 to 35 years, 2016-2020
In the period 2016-2020, cerebrovascular issues and diseases were the most common diagnosis associated with patients 65 and older transported via rotary-wing air ambulance, while heart attack was the top reason that 51-to-64-year-olds were transported this way (figure 14).

Injury to body (not shown in figure 14) was the number one reason for rotary-wing air ambulance transports for individuals aged 36 to 50, accounting for 12 percent of claim lines in that age group. Head injury was the second most common reason, with 11 percent of the distribution.

Figure 14. Most common diagnoses associated with rotary-wing air ambulance in the age group 65 and older, as compared to the age groups 36 to 50 and 51 to 64, 2016-2020
Geography

Fixed Wing

In the heat map below, states in which claim lines with fixed-wing air ambulance usage were a greater percentage of all medical claim lines than other states in 2019 are on the red end of the spectrum, while states with a lower percentage are on the green end (figure 15). That year, the five states with the highest use of fixed-wing air ambulance transport as a percentage of all medical claim lines in that state were (from highest to lowest) Alaska, Wyoming, Montana, South Dakota and New Mexico. The states with lowest use were (from lowest to highest) Kentucky, Connecticut, Virginia, Mississippi and Washington, DC. Rhode Island and Delaware had no utilization of fixed-wing air ambulance services in 2019.

Figure 15. Fixed-wing air ambulance claim lines as a percentage of all medical claim lines by state, 2019
In 2020, the five states with the highest use of fixed-wing air ambulance transport as a percentage of all medical claim lines in that state were the same as in 2019, except that Montana and South Dakota switched places. The top five states in 2020 were Alaska, Wyoming, South Dakota, Montana and New Mexico (figure 16). The five states with the lowest use in 2020 were Virginia, Kentucky, New Hampshire, New Jersey and Vermont. (Again, these do not include Rhode Island and Delaware, which had no utilization of fixed-wing air ambulance services.)

Figure 16. Fixed-wing air ambulance claim lines as a percentage of all medical claim lines by state, 2020

Mileage for fixed-wing air ambulance transport varied considerably from state to state in 2019, with flights originating in Alaska having the greatest average distance traveled (459 miles) and New York the shortest average distance (117 miles). The five states with the highest average mileage in 2019 were:

- Alaska—459 miles;
- Georgia—450 miles;
- Tennessee—432 miles;
- Arizona—431 miles; and
- South Carolina—399 miles.
The five states with the lowest average mileage from origination point to destination in 2019 (not including Rhode Island and Delaware) were:

- New York—117 miles;
- New Jersey—119 miles;
- Connecticut—123 miles;
- Maine—124 miles; and
- Mississippi—124 miles.\(^{13}\)

In 2020, the ranking of states based on average mileage for fixed-wing air ambulance transport shifted somewhat but the mileage remained variable. Flights originating in Alaska still had the highest average mileage (455 miles) while the shortest average mileage was found for flights originating in Massachusetts (111 miles).

The five states with the highest average mileage in 2020 were:

- Alaska—455 miles;
- Florida—444 miles;
- Georgia—429 miles;
- North Carolina—401 miles; and
- Indiana—382 miles.

The five states with the lowest average mileage in 2020 (not including Rhode Island and Delaware) were:

- Massachusetts—111 miles;
- New York—112 miles;
- Mississippi—124 miles;
- Oklahoma—133 miles; and
- Michigan—153 miles.

\(^{13}\) Although Maine and Mississippi appear to have the same average mileage due to rounding, Maine’s average mileage was 123.55 and Mississippi’s 124.0.
**Rotary Wing**

In 2019, rotary-wing air ambulance transport was more widely distributed (figure 17) than its fixed-wing counterpart (figure 15). Idaho had the highest utilization as a percentage of all medical claim lines in the state, followed by New Mexico, Wyoming, Alaska and Montana. Rhode Island, Connecticut, New Jersey, New York and Michigan had the lowest utilization as a percentage of all medical claim lines in the state in 2019.

![Figure 17](image_url)

**Figure 17.** Rotary-wing air ambulance claim lines as a percentage of all medical claim lines by state, 2019
In 2020, there were some changes to the five states with highest use of rotary-wing air ambulance transport as a percentage of all medical claim lines in the state (figure 18). Idaho remained the top state, followed by South Dakota, New Mexico, West Virginia and Wyoming. The states with the lowest use of rotary-wing air ambulance transport as a percentage of all medical claim lines in the state were Rhode Island, Vermont, Connecticut, Hawaii and New Jersey.

![Figure 18. Rotary-wing air ambulance claim lines as a percentage of all medical claim lines by state, 2020](image)

Average mileage for rotary-wing air ambulance transport varied from state to state in 2019 from a high of 102 miles for flights originating in Hawaii to a low of 25 miles in New York. The five states with the highest average mileage in 2019 were:

- Hawaii—102 miles;
- Colorado—99 miles;
- Wyoming—92 miles;
- North Dakota—91 miles; and
- Utah—89 miles.

The five states with the lowest average mileage in 2019 were:

- New York—25 miles;
- Washington, DC—26 miles;
- Connecticut—29 miles;
- New Hampshire—31 miles; and
- New Jersey—33 miles.
In 2020, the average mileage traveled by rotary-wing air ambulances increased nationally, from an overall average mileage of 60 miles in 2019 to 62 miles in 2020. The average mileage in 2020 changed in many states as well. The five states with the highest average mileage in 2020 were:

- Hawaii—126 miles;
- North Dakota—115 miles;
- Wyoming—110 miles;
- Nebraska—94 miles; and
- New Mexico—90 miles.

The five states with the lowest average mileage in 2020 were:

- Washington, DC—25 miles;
- Vermont—28 miles;
- New York—28 miles;\(^{14}\)
- New Hampshire—37 miles; and
- Pennsylvania—38 miles.

\(^{14}\) Although Vermont and New York appear to have the same average mileage due to rounding, Vermont’s average mileage was 27.8 and New York’s 28.2.
Outcomes

In emergencies, in the period 2016-2020, patients transported by air ambulance were much more likely to be admitted as inpatients to a hospital than patients transported by ground ambulance (figure 19). Emergency rotary-wing air ambulance transport had an 89.5 percent admission rate compared to a 10.5 percent rate of emergency room visit with no admission for that type of transport. In the same period, 88.7 percent of all patients transported by emergency fixed-wing air ambulance were admitted to an inpatient stay, while 11.3 percent of those patients did not get admitted.

During that period, emergency ground ambulance showed almost a 50/50 split, with 52.6 percent of patients who were transported via ground ambulance being admitted to the hospital and 47.4 percent of those patients not being admitted.

FAIR Health offers information about ground ambulance utilization as a point of comparison and to provide further descriptive information regarding ambulance services.

Figure 19. Percent of ambulance claim lines resulting or not resulting in an inpatient admission, by type of emergency ambulance (rotary-wing air, fixed-wing air, ground), 2016-2020
The rate of inpatient admission for patients transported by emergency ambulance was influenced by age, as seen in an analysis by age group in the period 2016-2020 (figure 20). Less than 50 percent of patients aged 50 and younger who were transported by emergency ground ambulance were admitted as inpatients (37.1 percent of those aged 0 to 18, 32.3 percent of those aged 19 to 35 and 39.2 percent of those aged 36 to 50). By comparison, patients aged 51 to 64 had a 52.2 percent inpatient admission rate and those aged 65 and older had a 61.8 percent inpatient admission rate.

Patients transported by air ambulance also showed an age-related progression. In every age group, more than 80 percent of patients had an inpatient admission as a result of all air ambulance transport. Among patients over the age of 50, however, the share with inpatient admission was over 90 percent. In the age group 51 to 64, the share was 91.1 percent for rotary wing and 91 percent for fixed wing; in the age group 65 and older, the share was 93.6 percent for rotary wing and 93.7 percent for fixed wing.

![Figure 20. Percent of emergency ambulance claim lines resulting in an inpatient admission by age group, 2016-2020](image-url)
In the period 2016-2020, males had a higher percentage of inpatient admissions after emergency ground ambulance transport than females in all age groups except the youngest—0 to 18 years (figure 21). In that age group, 35.4 percent of females were admitted to the hospital compared to 32.3 percent of males.

Figure 21. Percent of emergency ground ambulance claim lines resulting in an inpatient admission by age group and gender, 2016-2020
In the period 2016-2020, males and females transported by emergency rotary-wing air ambulance had a similar rate of admissions in every age group except for the 19- to 35-year-olds (figure 22). In that age group, 81.5 percent of female patients were admitted to the hospital compared to 75.8 percent of male patients.

Figure 22. Percent of emergency rotary-wing air ambulance claim lines resulting in an inpatient admission by age group and gender, 2016-2020
In the period 2016-2020, the diagnosis with the highest inpatient admission rate after a fixed-wing air ambulance transport was newborn disorders, which include respiratory conditions, sepsis infections and traumas incurred during birth. This diagnosis had a 99.6 percent admission rate.

Congenital malformations and deformities, including unspecified malformations of the heart and congenital malformations and deformities of the aorta, came in second place, with a 99.5 percent admission rate. Kidney failure, liver failure, heart failure and complications of pregnancy were also among the top diagnoses.

In the same period, the diagnosis with the highest inpatient admission rate after a rotary-wing air ambulance transport was complications in newborns, including extreme prematurity. Patients with this diagnosis were admitted to the hospital 100 percent of the time.

In second place, patients with newborn disorders, such as respiratory conditions, sepsis infections or traumas incurred during birth, were admitted to the hospital 99.4 percent of the time when transported via rotary-wing air ambulance. Liver failure, kidney failure, congenital malformations and deformities, and complications of labor and delivery were also among the top diagnoses.

Diagnostic conditions with the lowest inpatient admission rates after rotary-wing air ambulance transport are shown in figure 23. Note that all of the “lowest” still had over a 75 percent admission rate.

The category with the lowest rate of admission to the hospital (76 percent) was joint/soft tissue diseases and issues, of which the top diagnosis not resulting in admission was low back pain. Injury to body and head injury were, respectively, the second and third most common diagnoses that did not result in admission. The admission rate for injury to body was 79.1 percent, for head injury 80.3 percent. Non-specific pain, which includes acute pain not elsewhere classified, was the fourth most common diagnosis that did not result in admission, with an admission rate of 81 percent.

![Figure 23. Diagnoses with lowest inpatient admission rates after rotary-wing air ambulance transport, 2016-2020](image)
The diagnosis associated with ambulance transport is often converted to a different diagnosis upon inpatient admission. Table 1 shows the inpatient admission primary diagnostic groupings to which the ambulance diagnosis of general signs and symptoms was most commonly converted in the period 2016-2020. Fixed-wing air ambulance and ground ambulance were similar in their three most common admission diagnoses, both including bacterial infection (e.g., sepsis), general signs and symptoms (e.g., fever) and heart disease, though in different order. But for rotary-wing air ambulance, the number one conversion was stroke. Other differences in ranking of admission diagnoses among types of ambulance transport were noteworthy. For example, whereas heart attack was 4th for both types of air ambulance, it was 30th for ground ambulance transports.

Table 1. Most common conversion of general signs and symptoms as an ambulance diagnosis to an inpatient admission primary diagnostic grouping, 2016-2020

<table>
<thead>
<tr>
<th></th>
<th>Fixed Wing</th>
<th>Rotary Wing</th>
<th>Ground</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bacterial Infection</td>
<td>1</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>General Signs and Symptoms</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>3</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Heart Attack</td>
<td>4</td>
<td>4</td>
<td>30</td>
</tr>
<tr>
<td>Nervous System Diseases and Issues</td>
<td>5</td>
<td>16</td>
<td>11</td>
</tr>
<tr>
<td>Stroke</td>
<td>7</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>Sprains, Strains, Breaks and Fractures</td>
<td>22</td>
<td>18</td>
<td>4</td>
</tr>
<tr>
<td>Digestive System Issues</td>
<td>19</td>
<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Cerebrovascular Diseases</td>
<td>12</td>
<td>5</td>
<td>14</td>
</tr>
</tbody>
</table>

For the ambulance diagnosis of chest pain, the list of most common diagnoses to which it was converted upon inpatient admission in the period 2016-2020 was more uniform, perhaps because chest pain is more specific than general signs and symptoms (table 2). The top three were the same across all three forms of transport: from most to least common, heart attack, heart disease and chest pain. Hypertension was fourth for both fixed-wing air ambulance and ground ambulance; however, injury to body was fourth for rotary-wing air ambulance.

Table 2. Most common conversion of chest pain as an ambulance diagnosis to an inpatient admission primary diagnostic grouping, 2016-2020

<table>
<thead>
<tr>
<th></th>
<th>Fixed Wing</th>
<th>Rotary Wing</th>
<th>Ground</th>
</tr>
</thead>
<tbody>
<tr>
<td>Heart Attack</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Heart Disease</td>
<td>2</td>
<td>2</td>
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<tr>
<td>Chest Pain</td>
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<tr>
<td>Hypertension</td>
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<td>13</td>
<td>4</td>
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<tr>
<td>General Signs and Symptoms - Circulatory and Respiratory System</td>
<td>5</td>
<td>9</td>
<td>5</td>
</tr>
<tr>
<td>Injury to Body</td>
<td>15</td>
<td>4</td>
<td>20</td>
</tr>
<tr>
<td>Sprains, Strains, Breaks and Fractures</td>
<td>12</td>
<td>5</td>
<td>14</td>
</tr>
</tbody>
</table>
When the ambulance diagnosis is the less specific category signs and symptoms involving behavior and emotional state, the admission diagnosis is again, as with general signs and symptoms, more diverse and dependent on the type of transport (table 3). In the period 2016-2020, mental health conditions were in the top five admission diagnoses for all three types of transport, but otherwise there was considerable variation. For fixed-wing air ambulance, malignant neoplasm, specifically of brain, was the second most common inpatient admission diagnosis and substance use disorders was the third. Neither diagnosis, however, was among the top five for rotary-wing air ambulance and ground ambulance. For example, rotary-wing air ambulance diagnoses of signs and symptoms involving behavior and emotional state converted upon admission to heart disease most commonly, and stroke second most commonly.

### Table 3. Most common conversion of signs and symptoms involving behavior and emotional state as an ambulance diagnosis to an inpatient admission primary diagnostic grouping, 2016-2020

<table>
<thead>
<tr>
<th></th>
<th>Fixed Wing</th>
<th>Rotary Wing</th>
<th>Ground</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental Health Conditions</td>
<td>1</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Malignant Neoplasm</td>
<td>2</td>
<td>6</td>
<td>16</td>
</tr>
<tr>
<td>Substance Use Disorders</td>
<td>3</td>
<td>22</td>
<td>6</td>
</tr>
<tr>
<td>Signs and Symptoms</td>
<td>4</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Behavior and Emotional State</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Signs and Symptoms - Circulatory and Respiratory System</td>
<td>5</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>General Signs and Symptoms</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Heart Disease</td>
<td>14</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Stroke</td>
<td>6</td>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>Poisoning by, Adverse Effect of Drugs and Other Substances</td>
<td>11</td>
<td>5</td>
<td>8</td>
</tr>
</tbody>
</table>

### Conclusion

This study of air ambulance services makes several notable findings. Air ambulance claim lines increased each year from 2016 to 2020 as a percentage of all ambulance (ground and air) claim lines. From 2017 to 2020, average charges, estimated allowed amounts and Medicare reimbursements all increased for both fixed-wing and rotary-wing air ambulance transport.

In the period 2016-2020, air ambulance claim lines were predominantly associated with individuals 65 years and older. Fixed-wing air ambulance transport was associated more with males than females in all age groups except for the age group 36 to 50 years. Rotary-wing air ambulance transport was associated more with males than females in all age groups. The top diagnoses associated with air ambulance transport, as attributed by ambulance providers, differed by ambulance type. The top diagnoses associated with fixed-wing air ambulance rides were digestive system issues; heart attack; sprains, strains, breaks and fractures; chronic respiratory diseases; and general signs and symptoms involving the circulatory and respiratory systems. The top diagnoses associated with rotary-wing air ambulance rides were cerebrovascular issues and diseases, heart attack, head injury, injury to body and stroke.

Most, though not all, of the states with the highest use of air ambulances as a percentage of all medical claim lines in that state in 2020 were in the West. For fixed wing, the top five were Alaska, Wyoming, South Dakota, Montana and New Mexico; for rotary wing, the top five were Idaho, South Dakota, New Mexico, West Virginia and Wyoming. The two types of air ambulance differed in highest average mileage: for fixed wing, 455 miles in Alaska; for rotary wing, 126 miles in Hawaii.
In emergencies, in the period 2016-2020, patients transported by air ambulance were much more likely to be admitted as inpatients to a hospital than patients transported by ground ambulance. The diagnosis with the highest inpatient admission rate after a fixed-wing air ambulance transport was newborn disorders. The diagnosis with the highest inpatient admission rate after a rotary-wing air ambulance transport was complications in newborns.

FAIR Health hopes that this study will be useful to policy makers, researchers, payors, providers and consumers.
About FAIR Health

FAIR Health is a national, independent nonprofit organization dedicated to bringing transparency to healthcare costs and health insurance information through data products, consumer resources and health systems research support. FAIR Health qualifies as a public charity under section 501(c)(3) of the federal tax code. FAIR Health possesses the nation’s largest collection of private healthcare claims data, which includes over 35 billion claim records and is growing at a rate of over 2 billion claim records a year. FAIR Health licenses its privately billed data and data products—including benchmark modules, data visualizations, custom analytics and market indices—to commercial insurers and self-insurers, employers, providers, hospitals and healthcare systems, government agencies, researchers and others. Certified by the Centers for Medicare & Medicaid Services (CMS) as a national Qualified Entity, FAIR Health also receives data representing the experience of all individuals enrolled in traditional Medicare Parts A, B and D; FAIR Health includes among the private claims data in its database, data on Medicare Advantage enrollees. FAIR Health can produce insightful analytic reports and data products based on combined Medicare and commercial claims data for government, providers, payors and other authorized users. FAIR Health’s free, award-winning, national consumer websites are fairhealthconsumer.org and fairhealthconsumidor.org. For more information on FAIR Health, visit fairhealth.org.