ST.CLAIR COLLEGE

DATA ANALYTICS FOR BUSINESS

FINAL PROJECT REPORT

SEMESTER - 3

HEALTHCARE ANALYTICS DAB304

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Medicare Hospice Use and Spending by Provider Aggregate Report

Introduction

The Hospice Utilization and Payment Public Use File (PUF) gives the data on services which are being provided to the Medicare beneficiaries by hospice providers in different states and across three different years from the year of 2014 - 2016. The Hospice Dataset contains information on utilization, payment (Medicare and standard payment), submitted charges, primary diagnoses, sites of service, and hospice beneficiary demographics organized by CMS Certification Number and states. This PUF is based on information from CMS's Chronic Conditions Data Warehouse (CCW) data files. The data in the Hospice PUF covers calendar year 2015 and contains 100% final-action (i.e., all claim adjustments have been resolved) hospice claims for the Medicare population including beneficiaries enrolled in a Medicare Advantage plan.

Following are the columns which are contained in the data:

- **Provider ID**: The 6-digit identification number for the hospice provider on the claim.
- **Name**: The hospice provider name, as reported in the POS file.
- **Street Address**: The hospice provider address, as reported in the POS file.
- **City**: The city where the hospice provider is located, as reported in the POS file.
- **State**: The state where the hospice is located, as reported in the POS file. The fifty U.S. states, the District of Columbia and Puerto Rico are reported by the state postal abbreviation.
- **ZIP Code:** The hospice provider zip code, as reported in the POS file.
- **HRR:** The Hospital Referral Region the hospice provider is located, based on provider ZIP code.
- **Hospice Beneficiaries**: Number of distinct Medicare beneficiaries receiving at least one day of hospice care in the calendar year.
- **Total Days**: Total count of hospice care days provided in the calendar year. Includes first and last day of care.
- **Total Medicare Payment Amount**: Total amount that Medicare paid for hospice care. Hospice services do not have any cost-sharing requirements and the Medicare payment amount will equal the allowed amount.
- **Total Medicare Standard Payment Amount**: Total amount that Medicare paid for hospice care adjusted for geographic differences in payment rates.
- **Total Charge Amount**: Total charges that hospice providers submitted for hospice care.
- **Percent RHC Days:** Percent of total number of hospice days that were routine home care (RHC) days. RHC days identified using Revenue Code 0651.
- **Physician Services**: Total number of hospice care physician services provided. Physician services identified using Revenue Code 0657.
- **Home Health Visit Hours per Day:** Average number of hours per day of home health hospice care provided. Home health visits identified using Revenue Codes 0570, 0571, 0572 and 0579.

- **Skilled Nursing Visit Hours per Day:** Average number of hours per day of skilled nursing hospice care provided. Skilled nursing visits identified using Revenue Codes 0550, 0551, 0552 and 0559.
- **Social Service Visit Hours per Day:** Average number of hours per day of social services hospice care provided. Social service visits identified using Revenue Codes 0560, 0561, 0562 and 0569.
- **Total Live Discharges**: Number of distinct Medicare beneficiaries with live discharges from hospice care. A user was considered to have a live discharge if user did not die in hospice care and was not receiving hospice care in CY2015. Includes live discharges for any reason including revocation.
- **Hospice beneficiaries with 7 or fewer hospice care days**: Number of distinct Medicare beneficiaries with 7 or fewer hospice care days in CY2014. Excludes users whose hospice care continued from a previous calendar year or into the next calendar year.
- **Hospice beneficiaries with more than 60 hospice care days:** Number of distinct Medicare beneficiaries with more than 60 hospice care days in CY2014.
- **Hospice beneficiaries with more than 180 hospice care days:** Number of distinct Medicare beneficiaries with more than 180 hospice care days in CY2014.
- **Home Health Visit Hours per Day During Week Prior to Death:** Average number of hours per day of home health hospice care provided during the seven days prior to death. Home health visits identified using Revenue Codes 0570, 0571, 0572 and 0579.
- **Skilled Nursing Visit Hours per Day During Week Prior to Death:** Average number of hours per day of skilled nursing hospice care provided during the seven days prior to death. Skilled nursing visits identified using Revenue Codes 0550, 0551, 0552 and 0559.
- **Social Service Visit Hours per Day During Week Prior to Death**: Average number of hours per day of social services hospice care provided during the seven days prior to death. Social service visits identified using Revenue Codes 0560, 0561, 0562 and 0569.
- **Average Age:** Average age of Medicare beneficiaries using hospice care in CY2014.
- **Male hospice beneficiaries**: Number of distinct male Medicare beneficiaries receiving at least one day of hospice care in the calendar year.
- **Female hospice beneficiaries:** Number of distinct female Medicare beneficiaries receiving at least one day of hospice care in the calendar year.
- **White hospice beneficiaries**: Number of distinct white Medicare beneficiaries receiving at least one day of hospice care in the calendar year.
- **Black hospice beneficiaries:** Number of distinct black Medicare beneficiaries receiving at least one day of hospice care in the calendar year.
- **Asian hospice beneficiaries:** Number of distinct Asian Medicare beneficiaries receiving at least one day of hospice care in the calendar year.
- **Hispanic hospice beneficiaries:** Number of distinct Hispanic Medicare beneficiaries receiving at least one day of hospice care in the calendar year.
- **Other/unknown race hospice beneficiaries:** Number of distinct Medicare beneficiaries of other/unknown race receiving at least one day of hospice care in the calendar year.
- **Medicare Advantage hospice beneficiaries:** Number of distinct Medicare beneficiaries enrolled in Medicare Advantage for at least one month and receiving at least one day of hospice care in the calendar year.

- **Medicaid Eligible hospice beneficiaries**: Number of distinct Medicare beneficiaries eligible for Medicaid for at least one month and receiving at least one day of hospice care in the calendar year.
- **Hospice beneficiaries with a primary diagnosis of cancer:** Number of distinct Medicare beneficiaries receiving hospice care for a primary diagnosis of cancer. Clinical Classifications Software single level diagnosis categories 11-17 were used to define cancer diagnoses. If a user had more than one primary diagnosis the most frequent diagnosis in terms of hospice care days was used.
- **Hospice beneficiaries with a primary diagnosis of dementia:** Number of distinct Medicare beneficiaries receiving hospice care for a primary diagnosis of dementia. Clinical Classifications Software single level diagnosis category 653 were used to define dementia diagnoses. If a user had more than one primary diagnosis the most frequent diagnosis in terms of hospice care days was used.
- **Hospice beneficiaries with a primary diagnosis of stroke:** Number of distinct Medicare beneficiaries receiving hospice care for a primary diagnosis of stroke. Clinical Classifications Software single level diagnosis categories 109-113 were used to define stroke diagnoses. If a user had more than one primary diagnosis the most frequent diagnosis in terms of hospice care days was used.
- **Hospice beneficiaries with a primary diagnosis of circulatory/heart disease:** Number of distinct Medicare beneficiaries receiving hospice care for a primary diagnosis of circulatory/heart disease. Clinical Classifications Software single level diagnosis categories 96-108 and 114-121 were used to define circulatory/heart diagnoses. If a user had more than one primary diagnosis the most frequent diagnosis in terms of hospice care days was used.
- **Hospice beneficiaries with a primary diagnosis of respiratory disease:** Number of distinct Medicare beneficiaries receiving hospice care for a primary diagnosis of respiratory disease. Clinical Classifications Software single level diagnosis categories 127-134 were used to define respiratory diagnoses. If a user had more than one primary diagnosis the most frequent diagnosis in terms of hospice care days was used.
- **Hospice beneficiaries with other primary diagnoses:** Number of distinct Medicare beneficiaries receiving hospice care for a primary diagnosis other than cancer, dementia, circulatory/heart, stroke, or respiratory. If a user had more than one primary diagnosis the most frequent diagnosis in terms of hospice care days was used.
- **Site-of-service Home hospice beneficiaries:** Number of distinct Medicare beneficiaries receiving the majority of their hospice care days at home. Site of service was determined using HCPCS codes Q5001-Q5010, Q5001 indicates care provided in patient's private residence (home).
- **Site-of-service Assisted Living Facility hospice beneficiaries:** Number of distinct Medicare beneficiaries receiving the majority of their hospice care days in an assisted living facility. Site of service was determined using HCPCS codes Q5001-Q5010, Q5002 indicates care provided in an assisted living facility.
- **Site-of-service Long-term-care or non-skilled Nursing Facility hospice beneficiaries:** Number of distinct Medicare beneficiaries receiving the majority of their hospice care days in a long term care or non-skilled nursing facility. Site of service was

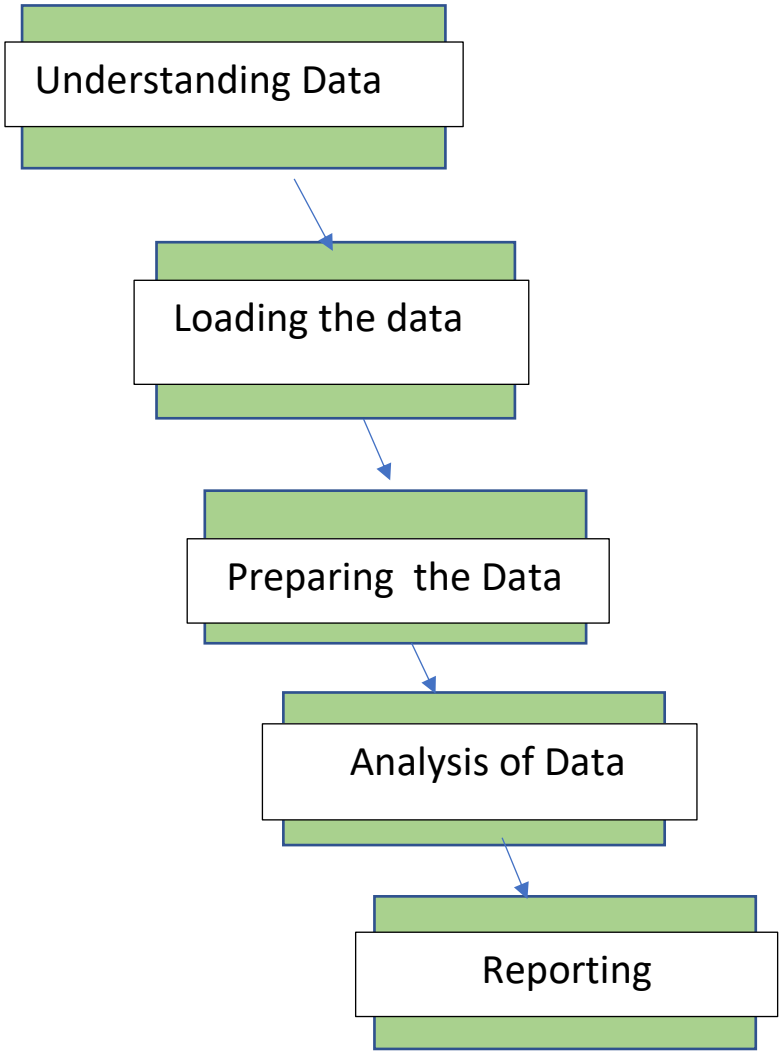
determined using HCPCS codes Q5001-Q5010, Q5003 indicates care provided in a long term care or non-skilled nursing facility.

- **Site-of-service Skilled Nursing Facility hospice beneficiaries:** Number of distinct Medicare beneficiaries receiving the majority of their hospice care days in a skilled nursing facility. Site of service was determined using HCPCS codes Q5001-Q5010, Q5004 indicates care provided in a skilled nursing facility.
- **Site-of-service Inpatient Hospital hospice beneficiaries:** Number of distinct Medicare beneficiaries receiving the majority of their hospice care days in an inpatient hospital. Site of service was determined using HCPCS codes Q5001-Q5010, Q5005 indicates care provided in an inpatient hospital.
- **Site-of-service Inpatient Hospice hospice beneficiaries:** Number of distinct Medicare beneficiaries receiving the majority of their hospice care days in an inpatient hospice facility. Site of service was determined using HCPCS codes Q5001-Q5010, Q5006 indicates care provided in an inpatient hospice facility.
- **Site-of-service Other Facility hospice beneficiaries:** Number of distinct Medicare beneficiaries receiving the majority of their hospice care days in a long term care hospital, psychiatric facility, home care in a hospice facility or unknown facility. Site of service was determined using HCPCS codes Q5001-Q5010, Q5007-Q5010 indicate care provided in other facilities

Related Work

- First, we obtained the data from Kaggle and understand the different aspects of data and its columns. We find this dataset to be interesting because it contains data related to utilization, payment (Medicare payment and standard payment), submitted charges, primary diagnoses, hospice beneficiary demographics organized by CMS Certification Number & state. Through our research we found that there are many possible cases where the hospice care service are used nowadays, we also found how essential hospice care is to the patient who are on there deathbed and are unable to do day-to-day work.

Methods :



Understanding Data : To first understand the data we used Microsoft Excel and try to find what each column in our data set contains and how they correlate with each other also we can see if there is any null values In the data set.

Loading the data: To further analyze our data we loaded our data into python using Pandas as well as we used tableau for this analysis..

Preparing the data: we used some of the functions like describe(), info() ,head() & tail() functions of panadas to see if there are any missing values in our data.

Analysis of Data: For analysis we did descriptive analysis on our data first then we used tableau to create dashboards to see the relationship among different variables and columns.

Reporting: We have listed all our findings, graphs . etc in the result section.

Loading the data

In Excel

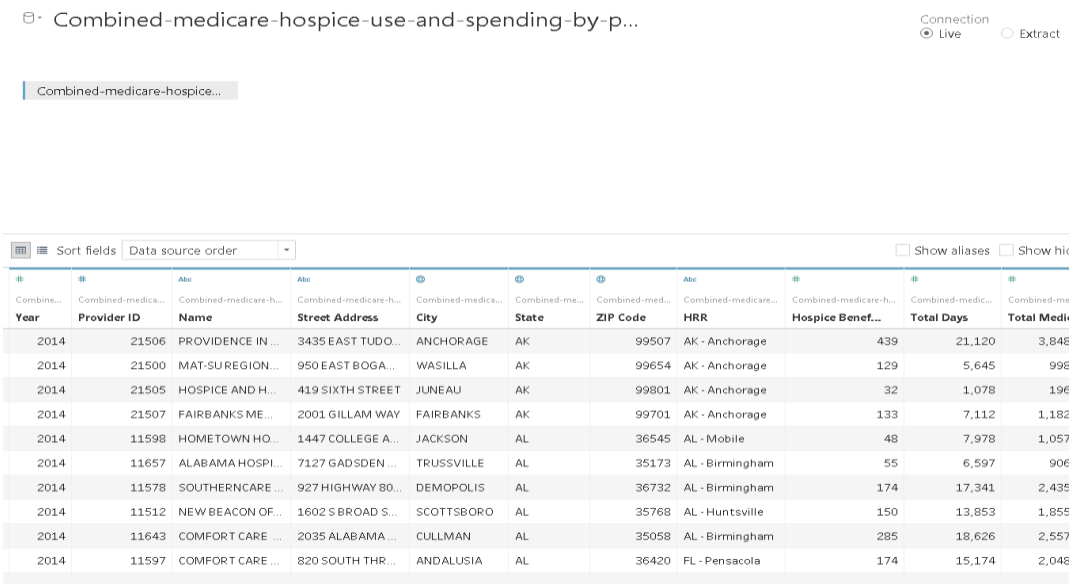
Year	Provider ID	Name	Street Add	City	State	ZIP Code	HRR	Hospice Be	Total Days	Total Med	Total Med	Total Char	Percent RH	Physician S	Home Hea	Skil
2014	21506	PROVIDEN	3435 EAST	ANCHORA	AK	99507	AK - Anchc	439	21120	3848946	3308336	11736508	100	163	0.05	
2014	21500	MAT-SU R	950 EAST E	WASILLA	AK	99654	AK - Anchc	129	5645	998137	876326.4	1301250	100	0	0.11	
2014	21505	HOSPICE A	419 SIXTH	JUNEAU	AK	99801	AK - Anchc	32	1078	196477.1	162064.5	262931.2	100	0	0.01	
2014	21507	FAIRBANK	2001 GILL	FAIRBANK	AK	99701	AK - Anchc	133	7112	1182418	1101484	1839220	100	55	0.14	
2014	11598	HOMETOV	1447 COLL	JACKSON	AL	36545	AL - Mobil	48	7978	1057347	1229974	1469477	100	0	0.3	
2014	11657	ALABAMA	7127 GAD	TRUSSVILL	AL	35173	AL - Birmir	55	6597	906236.7	1011117	1954629	100	0	0.25	
2014	11578	SOUTHERI	927 HIGH	DEMOPOL	AL	36732	AL - Birmir	174	17341	2435984	2787007	4744229	99		0.32	
2014	11512	NEW BEA	1602 S BR	SCOTTSBC	AL	35768	AL - Hunts	150	13853	1855471	2144632	2763258	100	0	0.26	
2014	11643	COMFORT	2035 ALAE	CULLMAN	AL	35058	AL - Birmir	285	18626	2557393	2891685	4115070	100	0	0.23	
2014	11597	COMFORT	820 SOUTI	ANDALUSI	AL	36420	FL - Pensa	174	15174	2048929	2374724	3252380	99	0	0.28	
2014	11608	AMERICAN	3235 OLD	SYLACAUG	AL	35150	AL - Birmir	106	10927	1454202	1678211	2793542	100	0	0.17	
2014	11505	HOSPICE F	3304 WES	HUNTSVIL	AL	35805	AL - Hunts	340	21209	2992195	3271719	4456694	100	0	0.2	
2014	11526	LAKESIDE I	4010 MAS	PELL CITY	AL	35128	AL - Birmir	157	11445	1549355	1768803	2609865	100	0	0.16	
2014	11655	SOUTHERI	102 CAME	GREENVIL	AL	36037	AL - Montg	148	15891	2144837	2485836	4474861	99		0.33	
2014	11660	OASIS HEA	2005 AGAI	MOODY	AL	35004	AL - Birmir	214	18644	2610397	2887585	5051795	99	12	0.22	
2014	11612	COLUMBL	1521 FIFTH	PHENIX CI	AL	36867	GA - Colun	249	26765	4203196	4637178	6212796	95	706	0.57	
2014	11501	NEW BEA	4735 NOR	TRUSSVILL	AL	35173	AL - Birmir	369	30778	4411218	4878705	6285086	99	70	0.26	
2014	11661	COOSA VA	315 WEST	SYLACAUG	AL	35150	AL - Birmir	69	8480	1148254	1334678	1593207	99	0	0.27	
2014	11649	SOUTHERI	201 MEDI	CLANTON	AL	35046	AL - Birmir	245	20590	2889631	3221917	5722362	99		0.2	
2014	11673	COMFORT	629 COOS	WETUMPK	AL	36092	AL - Montg	54	4056	537272.3	622746.5	853526	100	0	0.19	
2014	11500	BAPTIST H	301 INTER	MONTGOM	AL	36109	AL - Montg	367	19905	2752449	3186918	7388086	99	99	0.34	
2014	11674	GENTIVA H	5000 BRAI	HUNTSVIL	AL	35805	AL - Hunts	893	88375	11947106	13652296	17063688	99	0	0.25	
2014	11576	COMFORT	547 U.S. H	DEMOPOL	AL	36732	AL - Birmir	105	8501	1153757	1330776	1777858	99	0	0.32	
2014	11549	HOMESTE/	410 CHUR	SELMA	AL	36701	AL - Birmir	49	4050	535973.2	621237.9	1183707	100	0	0.5	
2014	11620	ALPHA OM	1017 WES	BUTLER	AL	36904	MS - Meric	12	192	25328.88	29364.24	28016.32	100	0	0	
2014	11653	SOUTHERI	26179 CAF	DAPHNE	AL	36526	AL - Mobil	443	45537	6091342	7059829	12822929	99		0.39	
2014	11623	AMEDISYS	8160 DECK	MONTGOM	AL	36117	AL - Montg	209	15316	2037198	2364355	3819206	100	0	0.26	
2014	11663	SOUTHEAS	4330 HIGH	JASPER	AL	35501	AL - Birmir	285	28473	3902159	4376814	6948930	100	0	0.39	

In Python

In [1]:
```
#import packages as needed
import pandas as pd
```

In [2]:
```
#Load data
hospicaredata = pd.read_csv("D:\\Semester-3\DAB304 Healthcare Analytics\Combined-medicare-hospice-use-and-spending-by-provider-aggregate-report-cy-2014-2015-2016.csv")
```

In Tableau



Year	Provider ID	Name	Street Address	City	State	ZIP Code	HRR	Hospice Benef...	Total Days	Total Medi
2014	21506	PROVIDENCE IN ...	3435 EAST TUDO...	ANCHORAGE	AK	99507	AK - Anchorage	439	21,120	3,848
2014	21500	MAT-SU REGION...	950 EAST BOGA...	WASILLA	AK	99654	AK - Anchorage	129	5,645	998
2014	21505	HOSPICE AND H...	419 SIXTH STREET	JUNEAU	AK	99801	AK - Anchorage	32	1,078	196
2014	21507	FAIRBANKS ME...	2001 GILLAM WAY	FAIRBANKS	AK	99701	AK - Anchorage	133	7,112	1,182
2014	11598	HOMETOWN HO...	1447 COLLEGE A...	JACKSON	AL	36545	AL - Mobile	48	7,978	1,057
2014	11657	ALABAMA HOSPI...	7127 GADSDEN ...	TRUSSVILLE	AL	35173	AL - Birmingham	55	6,597	906
2014	11578	SOUTHERNCARE ...	927 HIGHWAY 80...	DEMOPOLIS	AL	36732	AL - Birmingham	174	17,341	2,435
2014	11512	NEW BEACON OF...	1602 S BROAD S...	SCOTTSBORO	AL	35768	AL - Huntsville	150	13,853	1,855
2014	11643	COMFORT CARE ...	2035 ALABAMA ...	CULLMAN	AL	35058	AL - Birmingham	285	18,626	2,557
2014	11597	COMFORT CARE ...	820 SOUTH THR...	ANDALUSIA	AL	36420	FL - Pensacola	174	15,174	2,048

Preparing the Data

Part- 1

```
In [3]: #review the data
        hospicaredata.head()
```

Out[3]:

	Year	Provider ID	Name	Street Address	City	State	ZIP Code	HRR	Hospice Beneficiaries	Total Days	...	Hospice beneficiaries with a primary diagnosis of circulatory/heart disease	Hospice beneficiaries with a primary diagnosis of respiratory disease	Hospice beneficiaries with other primary diagnoses	ben
0	2014	21506	PROVIDENCE IN HOME SERVICES	3435 EAST TUDOR ROAD	ANCHORAGE	AK	99507.0	AK - Anchorage	439	21120	...	65.0	40.0	40.0	
1	2014	21500	MAT-SU REGIONAL HOSPICE	950 EAST BOGARD ROAD, SUITE 132	WASILLA	AK	99654.0	AK - Anchorage	129	5645	...	20.0	NaN	NaN	
2	2014	21505	HOSPICE AND HOME CARE OF JUNEAU	419 SIXTH STREET	JUNEAU	AK	99801.0	AK - Anchorage	32	1078	...	NaN	NaN	NaN	
3	2014	21507	FAIRBANKS MEMORIAL HOSPITAL HOSPICE SERVICES	2001 GILLAM WAY	FAIRBANKS	AK	99701.0	AK - Anchorage	133	7112	...	NaN	NaN	23.0	
4	2014	11598	HOMETOWN HOSPICE, INC	1447 COLLEGE AVE	JACKSON	AL	36545.0	AL - Mobile	48	7978	...	18.0	NaN	NaN	

5 rows × 48 columns

```
In [4]: hospicaredata.tail()
```

Out[4]:

	Year	Provider ID	Name	Street Address	City	State	ZIP Code	HRR	Hospice Beneficiaries	Total Days	...	Hospice beneficiaries with a primary diagnosis of circulatory/heart disease	Hospice beneficiaries with a primary diagnosis of respiratory disease	Hospice beneficiaries with other primary diagnoses	be
12044	2016	531505	SPIRIT MOUNTAIN HOSPICE	1021 9TH STREET	CODY	WY	82414.0	MT - Billings	99	3221	...	16.0	17.0	NaN	
12045	2016	531504	ST JOHN'S HOSPICE	555 EAST BROADWAY SUITE 115	JACKSON	WY	83001.0	UT - Salt Lake City	22	951	...	NaN	NaN	NaN	
12046	2016	531502	CHEYENNE REGIONAL DAVIS HOSPICE CENTER	6000 SYCAMORE ROAD	CHEYENNE	WY	82009.0	CO - Fort Collins	256	5991	...	49.0	39.0	59.0	
12047	2016	531501	CENTRAL WYOMING HOSPICE PROGRAM	319 SOUTH WILSON STREET	CASPER	WY	82601.0	WY - Casper	304	8524	...	34.0	50.0	85.0	
12048	2016	531500	HOSPICE OF SWEETWATER COUNTY INC	333 BROADWAY STREET, SUITE 220	ROCK SPRINGS	WY	82901.0	UT - Salt Lake City	75	3803	...	14.0	NaN	NaN	

5 rows × 48 columns

We used head() tail() function to take a initial look at our data and how it structured.

Part- 2

Calculating the NULL values

```
In [7]: hospicaredata.isnull().sum()
```

```
Out[7]: Year                                                                    0
Provider ID                                                             0
Name                                                                    2
Street Address                                                          2
City                                                                    2
State                                                                   0
ZIP Code                                                                2
HRR                                                                     0
Hospice Beneficiaries                                                   0
Total Days                                                              0
Total Medicare Payment Amount                                           0
Total Medicare Standard Payment Amount                                  0
Total Charge Amount                                                     0
Percent RHC Days                                                        0
Physician Services                                                   1246
Home Health Visit Hours per Day                                         0
Skilled Nursing Visit Hours per Day                                     0
Social Service Visit Hours per Day                                      0
Total Live Discharges                                                3121
Hospice beneficiaries with 7 or fewer hospice care days              2737
Hospice beneficiaries with more than 60 hospice care days            1020
Hospice beneficiaries with more than 180 hospice care days           3579
Home Health Visit Hours per Day During Week Prior to Death              0
Skilled Nursing Visit Hours per Day During Week Prior to Death          0
Social Service Visit Hours per Day During Week Prior to Death           0
Average Age                                                             0
Male hospice beneficiaries                                            933
Female hospice beneficiaries                                          933
White hospice beneficiaries                                           479
Black hospice beneficiaries                                          4754
Asian hospice beneficiaries                                          6082
Hispanic hospice beneficiaries                                       6493
Other/unknown race hospice beneficiaries                             8600
Medicare Advantage hospice beneficiaries                             2174
Medicaid Eligible hospice beneficiaries                              2008
Hospice beneficiaries with a primary diagnosis of cancer             2001
Hospice beneficiaries with a primary diagnosis of dementia           2687
Hospice beneficiaries with a primary diagnosis of stroke             5292
Hospice beneficiaries with a primary diagnosis of circulatory/heart disease  2182
Hospice beneficiaries with a primary diagnosis of respiratory disease  4503
Hospice beneficiaries with other primary diagnoses                   3653
Site-of-service Home hospice beneficiaries                            407
Site-of-service Assisted Living Facility hospice beneficiaries       3740
Site-of-service Long-term-care or non-skilled Nursing Facility hospice beneficiaries  2245
Site-of-service Skilled Nursing Facility hospice beneficiaries       4092
Site-of-service Inpatient Hospital hospice beneficiaries             3481
Site-of-service Inpatient Hospice hospice beneficiaries              1856
Site-of-service Other Facility hospice beneficiaries                 5467
dtype: int64
```

As we can see there are so many NULL values in our data. So to deal with them we have to filter them for our analysis and then proceed any further.

Results

Descriptive analysis

```
In [6]: #descriptive statistics
        print(hospicaredata.describe())
```

```
                Year    Provider ID      ZIP Code  Hospice Beneficiaries  \
count  12049.000000   12049.000000  12047.000000           12049.000000
mean    2015.017429  323702.989875  57378.029966             354.528094
std        0.816717  198955.448272  27682.982558             672.799089
min     2014.000000   11500.000000    601.000000              11.000000
25%     2014.000000  151610.000000  33126.000000              73.000000
50%     2015.000000  321525.000000  62220.000000             172.000000
75%     2016.000000  451777.000000  79930.500000             384.000000
max     2016.000000  921534.000000  99801.000000           25879.000000

          Total Days  Total Medicare Payment Amount  \
count  1.204900e+04                   1.204900e+04
mean   2.399450e+04                   3.964232e+06
std    5.048985e+04                   9.401504e+06
min    7.900000e+01                   1.081761e+04
25%    5.239000e+03                   8.102008e+05
50%    1.249100e+04                   1.932640e+06
75%    2.688800e+04                   4.304933e+06
max    2.610362e+06                   4.863686e+08

       Total Medicare Standard Payment Amount  Total Charge Amount  \
count                            1.204900e+04         1.204900e+04
mean                             4.028648e+06         7.050589e+06
std                              9.584881e+06         1.814049e+07
min                              1.253350e+04         1.277033e+04
25%                              8.413582e+05         1.321765e+06
50%                              2.025179e+06         3.226510e+06
75%                              4.398192e+06         7.439881e+06
max                              5.088826e+08         9.804216e+08

       Percent RHC Days  Physician Services  \
count      12049.000000        10803.000000
mean          98.643373          306.663890
std            2.764053         1952.222908
min            9.000000            0.000000
25%           99.000000            0.000000
50%          100.000000            0.000000
75%          100.000000           54.000000
max          100.000000       100641.000000
```

Above are the descriptive analysis for all the numerical columns in our data.

Correlation matrix

Relation matrix | Relation table | Relation map

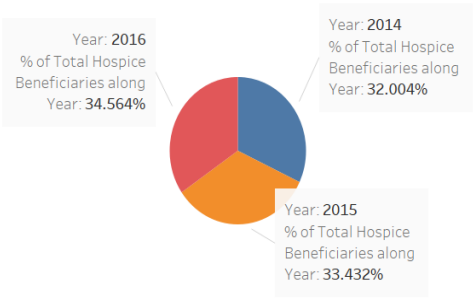
	Row number	Year	Provider ID	Name	Street Address	City	State	ZIP Code	HRR	Hospice Beneficiaries	Total Days	Total Medicare Payment	Total Medicare Standard	Total Charge Amount	Percent RHC Days	Physician Services	Home Health Visit Hours	Skilled Nursing Visit Hours	Social Service Visit Hours	Total Live Discharges	Hospice beneficiaries with
Row number	-	94%	22%	16%	100%	14%	27%	6%	18%	7%	6%	6%	7%	5%	3%	0%	3%	4%	4%	1%	8%
Year	94%	-	0%	14%	100%	12%	13%	2%	14%	4%	3%	5%	5%	4%	4%	0%	1%	1%	4%	1%	5%
Provider ID	22%	0%	-	18%	100%	41%	77%	13%	58%	14%	10%	10%	10%	12%	6%	3%	3%	3%	15%	7%	6%
Name	16%	14%	18%	-	100%	14%	17%	15%	13%	9%	15%	13%	13%	9%	12%	6%	15%	9%	16%	11%	9%
Street Address	100%	100%	100%	100%	-	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
City	14%	12%	41%	14%	100%	-	29%	28%	43%	12%	11%	11%	11%	10%	13%	7%	14%	17%	18%	13%	11%
State	27%	13%	77%	17%	100%	29%	-	83%	53%	26%	21%	21%	21%	22%	25%	18%	29%	25%	34%	22%	27%
ZIP Code	6%	2%	13%	15%	100%	28%	83%	-	60%	25%	19%	16%	20%	18%	16%	2%	22%	3%	12%	13%	21%
HRR	18%	14%	58%	13%	100%	43%	53%	60%	-	20%	15%	15%	15%	15%	20%	13%	27%	20%	25%	16%	21%
Hospice Beneficiaries	7%	4%	14%	9%	100%	12%	26%	25%	20%	-	94%	95%	95%	95%	40%	52%	23%	16%	19%	76%	92%
Total Days	6%	3%	10%	15%	100%	11%	21%	19%	15%	94%	-	99%	100%	98%	27%	48%	28%	4%	10%	81%	74%
Total Medicare Payment	6%	5%	10%	13%	100%	11%	21%	16%	15%	95%	99%	-	100%	98%	30%	50%	28%	7%	11%	81%	77%
Total Medicare Standard	7%	5%	10%	13%	100%	11%	21%	20%	15%	95%	100%	100%	-	98%	31%	50%	28%	5%	10%	81%	77%
Total Charge Amount	5%	4%	12%	9%	100%	10%	22%	18%	15%	95%	98%	98%	98%	-	34%	52%	30%	12%	12%	79%	79%
Percent RHC Days	3%	4%	6%	12%	100%	13%	25%	16%	20%	40%	27%	30%	31%	34%	-	47%	9%	30%	8%	29%	54%
Physician Services	0%	0%	3%	6%	100%	7%	18%	2%	13%	52%	48%	50%	50%	52%	47%	-	12%	23%	7%	45%	58%
Home Health Visit Hours	3%	1%	3%	15%	100%	14%	29%	22%	27%	23%	28%	28%	28%	30%	9%	12%	-	16%	13%	17%	14%
Skilled Nursing Visit Hou	4%	1%	3%	9%	100%	17%	25%	3%	20%	16%	4%	7%	5%	12%	30%	23%	16%	-	33%	5%	25%
Social Service Visit Hours	4%	4%	15%	16%	100%	18%	34%	12%	25%	19%	10%	11%	10%	12%	8%	7%	13%	33%	-	9%	12%
Total Live Discharges	1%	1%	7%	11%	100%	13%	22%	13%	16%	76%	81%	81%	81%	79%	29%	45%	17%	5%	9%	-	61%
Hospice beneficiaries wit	8%	5%	6%	9%	100%	11%	27%	21%	21%	92%	74%	77%	77%	79%	54%	58%	14%	25%	12%	61%	-

The above given graph shows the correlation between each column in our data. To create this matrix we used online tool from "answerminer.com"

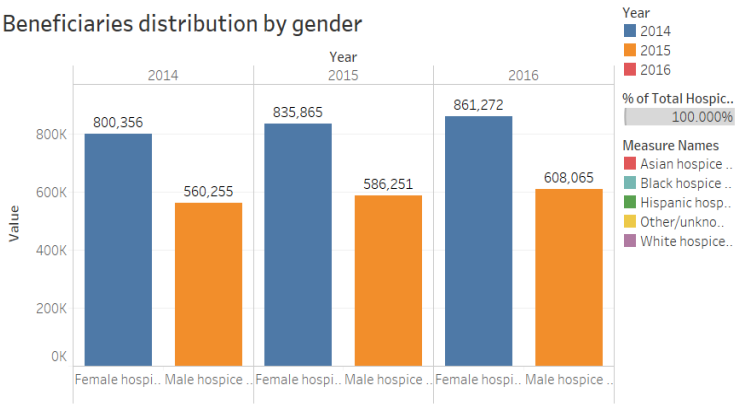
Charts and dashboards

Total Hospice beneficiary Distribution

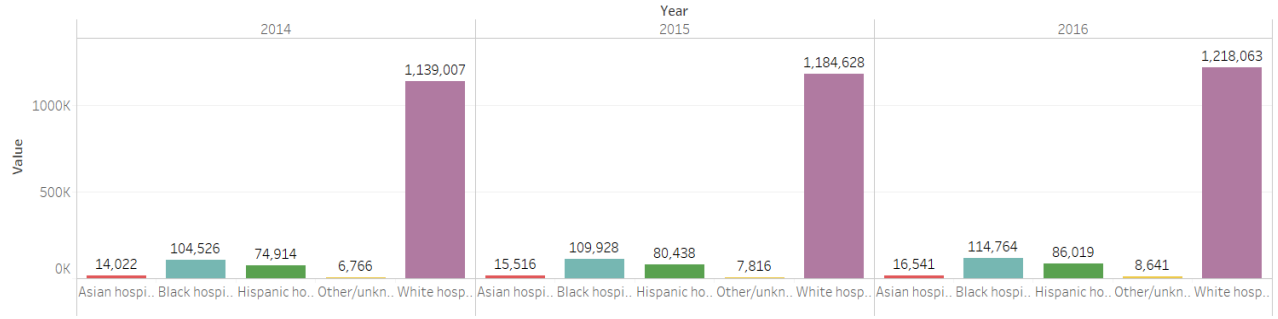
Distribution of Hospice beneficiaries across years.



Beneficiaries distribution by gender



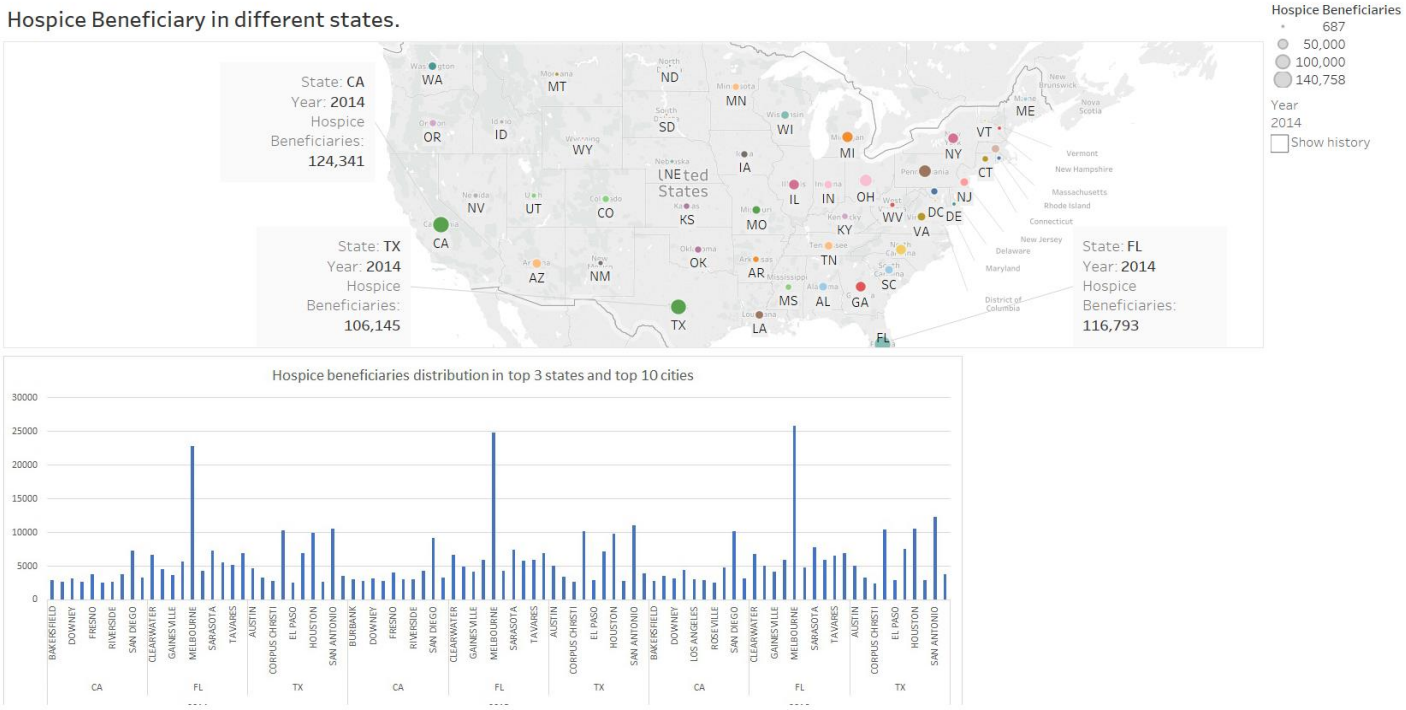
Beneficiaries distribution by ethinicity



This Dashboard represents the number of records of Hospice beneficiaries,

- First, we can see the yearly distribution the percentage of hospice beneficiaries which is increasing steadily every year.
- Next, we can see that how Beneficiaries genders are distributed across different years. As we can see here that there are more females as compare to male beneficiaries and this trend is same across multiple years. Also we can see that there is a increasing trend over all in both gender yearly.
- If we compare Gender wise, Female hospice beneficiaries higher than the Males in each year.
- The values of female record reach 861,272, while, the males record 608,065 in the year of 2016 as compare to 2014 where males were 560,255 and females were 800,356. Thus we can see the large difference between gender's record.
- The third graph shows the beneficiaries distribution by ethnicity, which represents that the majority of white hospice beneficiaries whereas, the minority of hospice beneficiaries are unknown in each year.

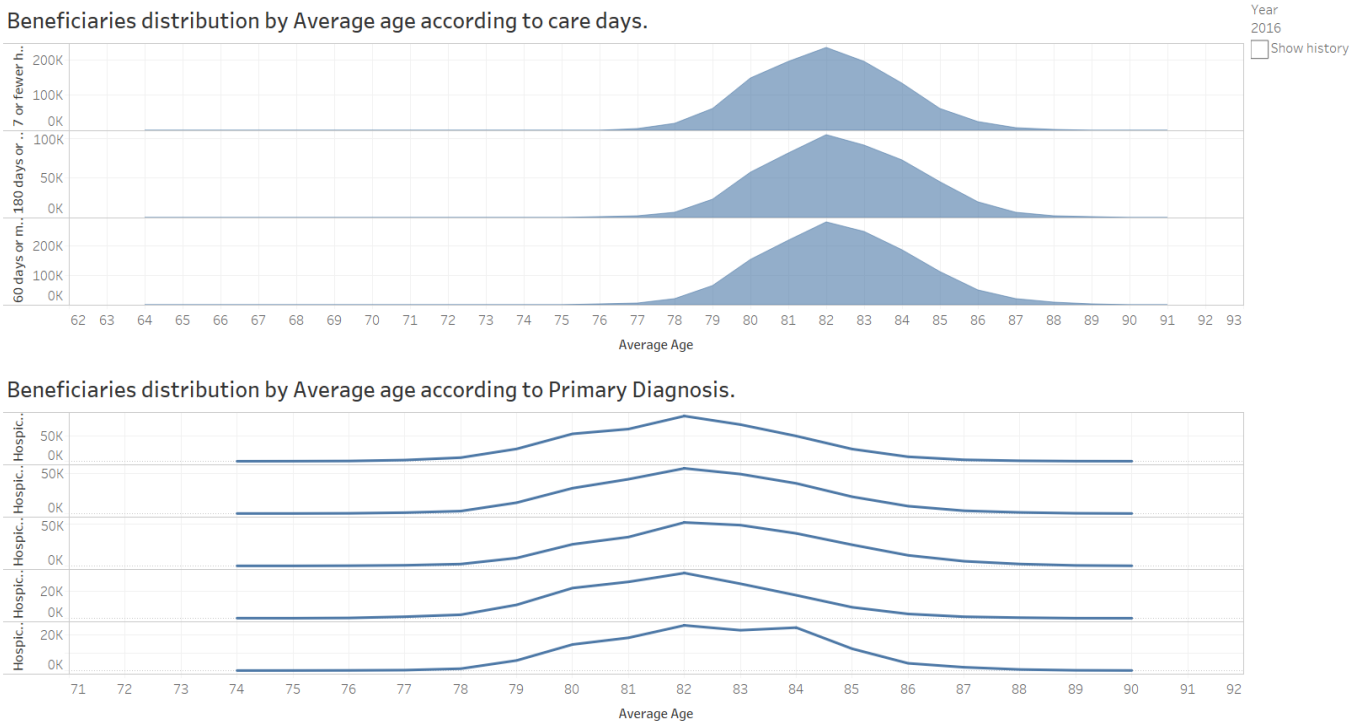
Hospice beneficiary in different states and cities



This Dashboard represents the number of Hospice beneficiaries in different states of USA and the top 10 cities of the top 3 states of CA, TX & FL.

- First, we can see that among all the states of USA the to three states where number of beneficiaries were highest was CA, TX & FL.
- we did this comparison for multiple years and found out that the trend was same for all years.
- Next, we can see that which city in these states have the highest number of hospice beneficiaries. As we can see in the chart given above in FL the Melbourne has the highest number of beneficiaries followed by San Antonio in TX and finally San Diego in CA.
- We can see this tend cross multiple years.

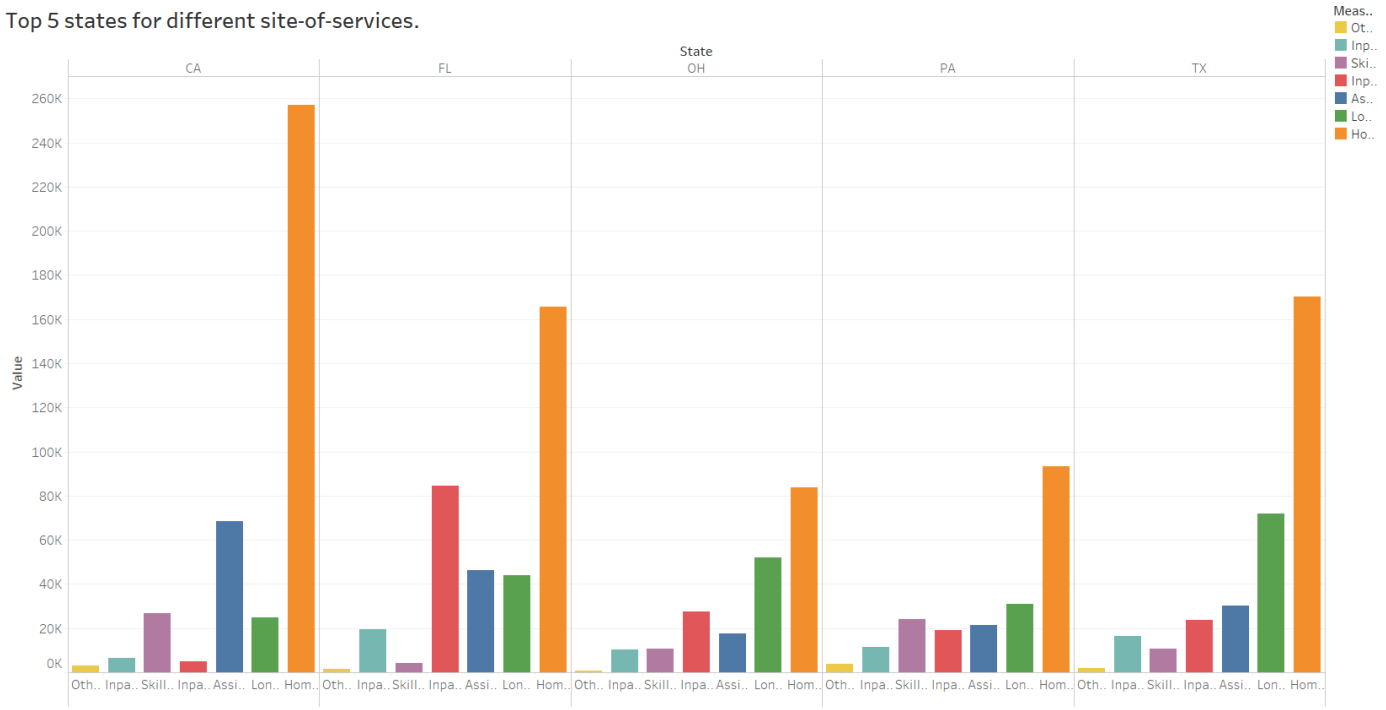
Comparison of Average with Care days and primary Diagnosis



This Dashboard represents the comparison between the average age of beneficiaries vs number of care days and the primary diagnosis of hospice patients.

- First, we can see that the average age and days of care comparison, here we can see that the average age has been same for all the care days groups. For all the groups of care days of 7 or fewer, 60 days or more and 180 days or more the average age is around 81-83 years at highest.
- Next, we can see that according to the primary diagnosis the average age is also similar for all the hospice patients for all the years.

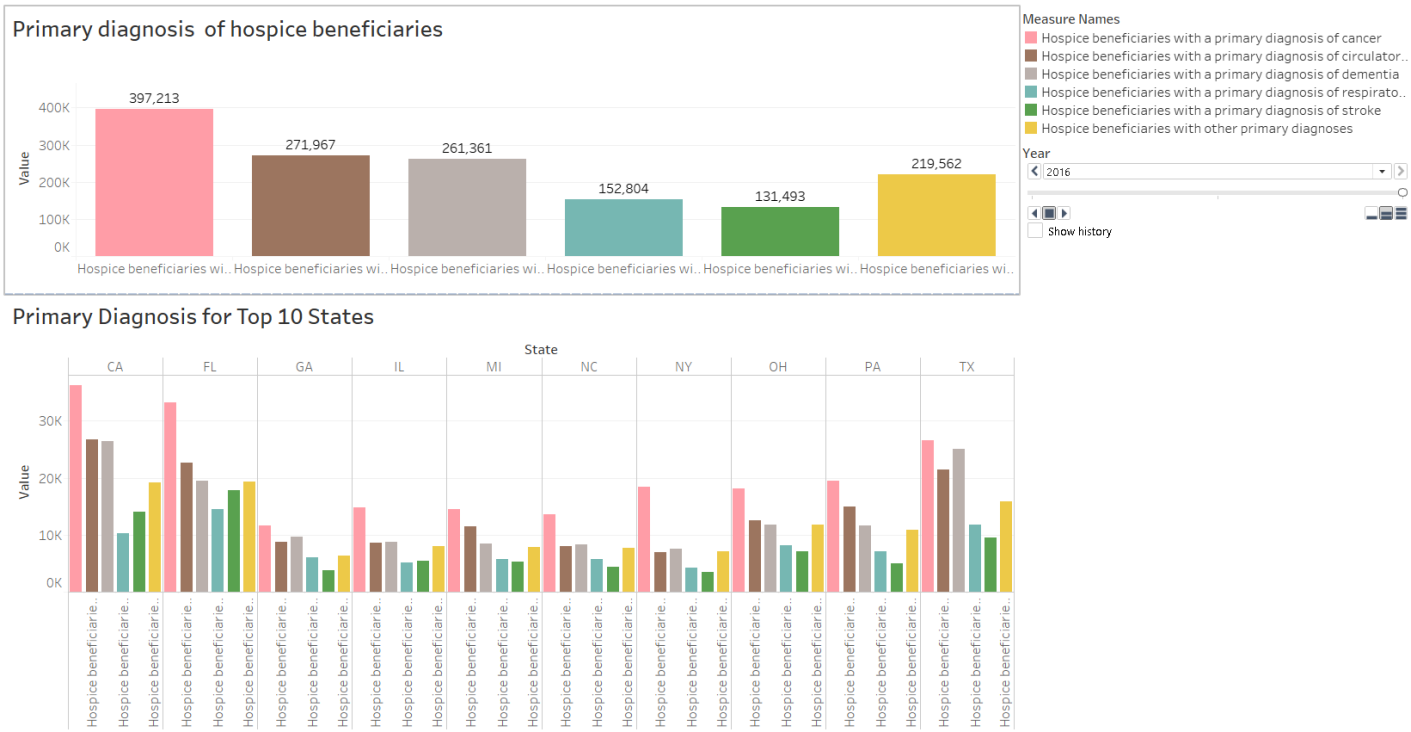
Top 5 states according to site-of-services



This graph represents the comparison between the top5 states in USA and the different sites of services for hospice patients.

- First, we can see that the CA has the most number of hospice beneficiaries for hospice care and the highest amount of beneficiaries are included In the Home hospice care. Followed by assisted care living facility. If we see the results for FL the trend is similar for Home hospice beneficiaries but it is followed by Inpatient Hospice beneficiaries.
- Next for OH, PA & TX the amount is highest for Home hospice care beneficiaries and is followed by Long-term-care and Non-skilled nursing service.

Top 5 states according to site-of-services



This graph represents the primary diagnosis for hospice beneficiaries and which primary diagnosis is the highest in top 10 states.

- First, we can see that the primary diagnosis for cancer has the highest number of hospice beneficiaries. Where least number of beneficiaries are for respiratory diseases
- Next, we can see in all top 10 states the hospice beneficiaries are the highest in all years and the least number of beneficiaries are with primary diagnosis of stroke are in TX,PA,OH,NYNC,MI & GA and for CA, FL, IL the least number of primary diagnosis patients are with Respiratory Disease.

Indicating data

Years	Live Discharges	%Medicaid Eligible hospice beneficiaries	%Medicare Standard Payment Amount paid adjusted acc geo	%Total Charge Amount which provider submit	%Total Medicare Payment Amount to provider
2014	32.70%	32.01%	31.38%	32.11%	31.52%
2015	32.64%	33.39%	33.27%	33.50%	33.24%
2016	34.66%	34.59%	35.35%	34.39%	35.23%

Live Discharges – As we can see that live discharges are increasing yearly, but that might be due to the fact that patients are being treated well enough to go to home or There want to spend their further time with their families or they don't want to spend more money on this facility.

Medical Eligible Hospice Beneficiaries – As we can see that the medical eligible are increasing over the years. This may be due to the case that number of people with diseases are increasing that might be the case the Medicaid is also increasing.

Medicare standard payment amount paid adjusted acc Geo location- As we can see that the overall standard payment is increasing by year. Medicare standard payment is increasing may be due geo location between different facilities for Ex- if the hospital is located in one city that doesn't mean the charges will be same when you go to other facility in different city.

Total charge amount – This show the charged amount for hospice care submitted to Medicare. As we can see this is also increasing by year.

Medicare payment amount to provider – This show how much a patient is paying to the medicare provider as we can see it is also increasing.

Prescriptive analysis

From our analysis we have seen that there are increasing trend in the amount of Hospice beneficiaries , medical expenses and all other things. This is due to the fact that the Different diseases are increasing and the services which the hospice are is providing might not be enough. For the future we can say that these things will definitely increase and we might need more hospice care facilities and with that we know that this will definitely impact patients and the charged amount for which the patients are being charged for which in fact will be increased. In the end we have to expand our level of approach to deal with these issue.

Conclusion

In the end we have seen that there are a lot of things that are effecting the hospice beneficiary healthcare for that our analysis has provide us with a solid information. With this we can conclude that overall trend is increasing and it will increase in future as well.

Contributions

It is essential to build a team and manage its all team members in a way that the final project result is achieved. In our case everyone has participated quite equally to make the project successful and the different duties are performed well enough to achieve our end goal. All the project documentation and visualization are done by everyone so we can say everyone is equally responsible for the project.

References and links:

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