

# Intensive Care in Germany

## Data Source

[DIVI-Intensivregister](#) monitors the ICU capacities of 1,300 hospitals in Germany.

## Setup

```
In [1]: # standard library  
import datetime  
import math
```

```
In [2]: # third party  
import numpy as np  
import pandas as pd  
import matplotlib.pyplot as plt  
import requests
```

## Date this Notebook was run

```
In [3]: today = datetime.datetime.today().strftime('%Y-%m-%d')  
today
```

```
Out[3]: '2021-05-14'
```

```
In [4]: # style like ggplot in R  
plt.style.use('ggplot')
```

```
In [5]: # Avoid cutting off part of the axis labels, see:  
# https://stackoverflow.com/questions/6774086/why-is-my-xlabel-cut-off-in-my-matplotlib-plot  
plt.rcParams.update({'figure.autolayout': True})
```

## Get Data

```
In [6]: timeline_data = "https://diviexchange.blob.core.windows.net/%24web/bundesland-zeitreihe.csv"
```

```
In [7]: timeline_df = pd.read_csv(timeline_data)
```

```
In [8]: timeline_df.tail(3)
```

```
Out[8]:
```

	Datum	Bundesland	Anzahl_Meldebereiche_Erwachsene	Aktuelle_COVID_Faelle_Erwachsene_ITS	Belegte_Intensivbetten_Ei
7137	2021-05-13T12:15:00+02:00	BADEN_WUERTTEMBERG	128	582	
7138	2021-05-13T12:15:00+02:00	HAMBURG	24	83	
7139	2021-05-13T12:15:00+02:00	DEUTSCHLAND	1332	4245	

## Rename Columns

### Convert datatype of date column

```
In [9]: timeline_df["Datum"] = timeline_df["Datum"].str[:10]
        timeline_df.head()
```

```
Out[9]:
```

	Datum	Bundesland	Anzahl_Meldebereiche_Erwachsene	Aktuelle_COVID_Faelle_Erwachsene_ITS	Belegte_Intensivbetten_Erwachser
0	2020-03-20	SCHLESWIG_HOLSTEIN	13	7	:
1	2020-03-20	NORDRHEIN_WESTFALEN	55	35	{
2	2020-03-20	NIEDERSACHSEN	25	17	4
3	2020-03-20	MECKLENBURG_VORPOMMERN	10	1	
4	2020-03-20	RHEINLAND_PFALZ	15	14	4

```
In [10]: timeline_df.iloc[:, [0]] = timeline_df.iloc[:, [0]].apply(pd.to_datetime)
```

In [11]: `timeline_df.info()`

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 7140 entries, 0 to 7139
Data columns (total 13 columns):
#   Column                                     Non-Null Count  Dtype
---  -
0   Datum                                     7140 non-null   datetime64[ns]
1   Bundesland                               7140 non-null   object
2   Anzahl_Meldebereiche_Erwachsene          7140 non-null   int64
3   Aktuelle_COVID_Faelle_Erwachsene_ITS     7140 non-null   int64
4   Belegte_Intensivbetten_Erwachsene        7140 non-null   int64
5   Freie_Intensivbetten_Erwachsene          7140 non-null   int64
6   7_Tage_Notfallreserve_Erwachsene         7140 non-null   int64
7   Freie_IV_Kapazitaeten_Gesamt             7140 non-null   int64
8   Freie_IV_Kapazitaeten_Davon_COVID        7140 non-null   int64
9   Betriebssituation_Regulaerer_Betrieb     7140 non-null   int64
10  Betriebssituation_Teilweise_Eingeschraenkt 7140 non-null   int64
11  Betriebssituation_Eingeschraenkt         7140 non-null   int64
12  Betriebssituation_Keine_Angabe           7140 non-null   int64
dtypes: datetime64[ns](1), int64(11), object(1)
memory usage: 725.3+ KB
```

In [12]: `federal_level = timeline_df[timeline_df.Bundesland=='DEUTSCHLAND']`  
`federal_level.tail()`

Out[12]:

	Datum	Bundesland	Anzahl_Meldebereiche_Erwachsene	Aktuelle_COVID_Faelle_Erwachsene_ITS	Belegte_Intensivbetten_Erwachsene	Freie_Inte
<b>7071</b>	2021-05-09	DEUTSCHLAND	1333	4569		20146
<b>7088</b>	2021-05-10	DEUTSCHLAND	1333	4571		20510
<b>7105</b>	2021-05-11	DEUTSCHLAND	1333	4449		20818
<b>7122</b>	2021-05-12	DEUTSCHLAND	1333	4361		20904
<b>7139</b>	2021-05-13	DEUTSCHLAND	1332	4245		20513

## Used Beds (Adults)

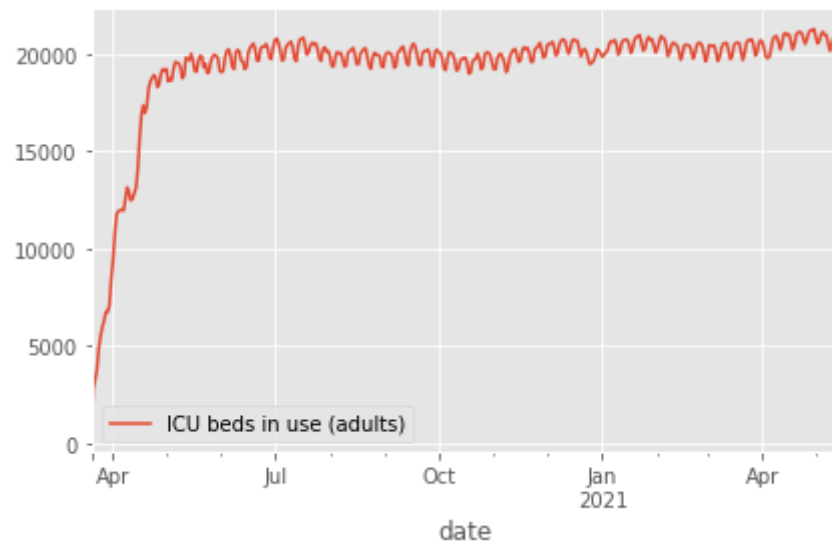
```
In [13]: used_beds = federal_level.loc[ : , ['Datum', 'Belegte_Intensivbetten_Erwachsene']]
used_beds.columns = ['date', 'ICU beds in use (adults)']
used_beds.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 420 entries, 16 to 7139
Data columns (total 2 columns):
#   Column                                Non-Null Count  Dtype
---  -
0   date                                420 non-null    datetime64[ns]
1   ICU beds in use (adults)           420 non-null    int64
dtypes: datetime64[ns](1), int64(1)
memory usage: 9.8 KB
```

```
In [14]: used_beds.set_index('date', inplace=True)
```

```
In [15]: used_beds.plot()
```

```
Out[15]: <AxesSubplot:xlabel='date'>
```



## Covid-19 patients in ICU

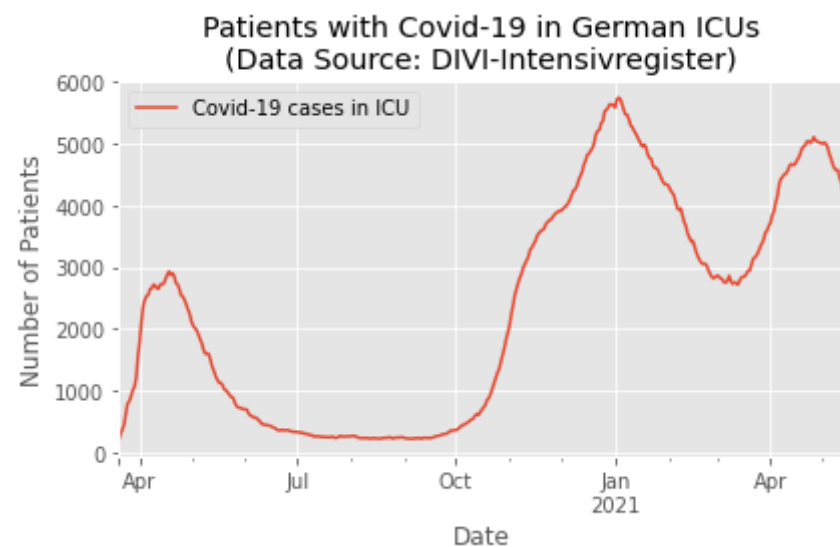
```
In [16]: icu = federal_level.loc[ : , ['Datum', 'Aktuelle_COVID_Faelle_Erwachsene_ITS']]
```

```
In [17]: icu.columns = ['date', 'Covid-19 cases in ICU']
```

```
icu.set_index('date', inplace=True)  
icu.info()
```

```
<class 'pandas.core.frame.DataFrame'>  
DatetimeIndex: 420 entries, 2020-03-20 to 2021-05-13  
Data columns (total 1 columns):  
#   Column                Non-Null Count  Dtype    
---  ---                  
0   Covid-19 cases in ICU  420 non-null   int64    
dtypes: int64(1)  
memory usage: 6.6 KB
```

```
In [18]: icu_cases = icu.plot(  
        title='Patients with Covid-19 in German ICUs\n(Data Source: DIVI-Intensivregister)',  
        xlabel='Date',  
        ylabel='Number of Patients')
```



```
In [19]: fig = icu_cases.get_figure()  
fig.savefig('img/covid-19-patients-in-icu-germany.png')
```