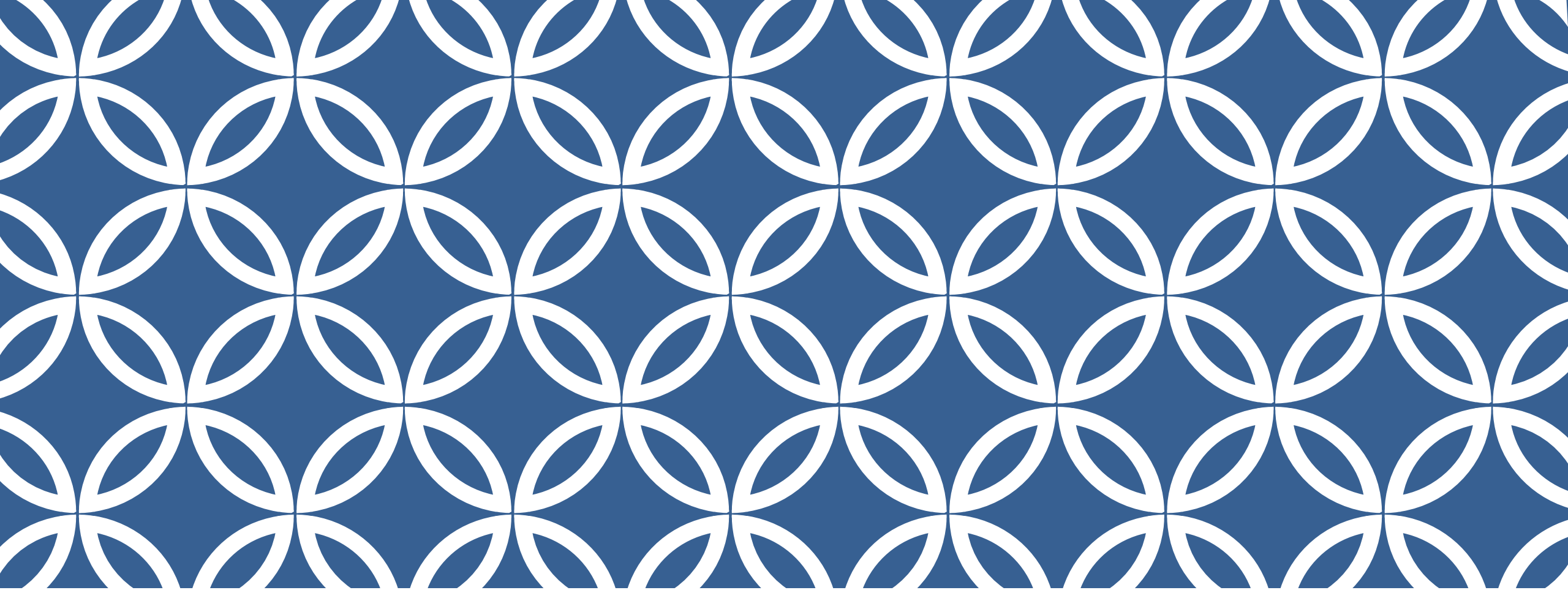

Data Transformation

Session 5

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Presentation adapted from…

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Goal

1. Learn how to use dplyr to transform data frames
2. Appreciate the role of piping in facilitating data transformation

Objectives

1. Use the pipe operator to pass the output of one function as an input to the next function
2. Create new calculated columns not found in the original data frame

%>%

Data Analysis Steps

```
day_10 <- filter(covid_testing, pan_day <= 10)

day_10 <- select(day_10, clinic_name)

day_10 <- arrange(day_10, clinic_name)
```

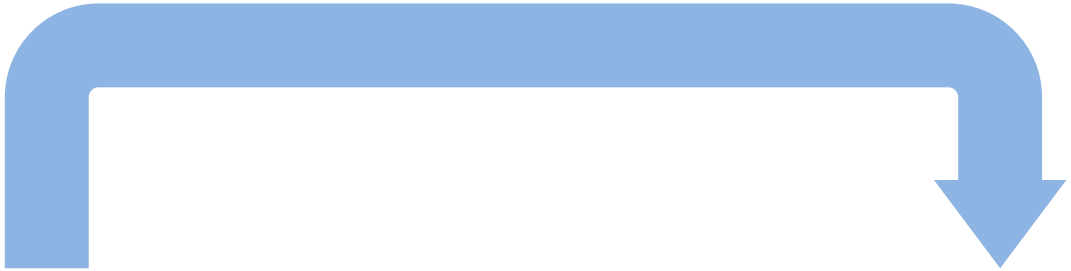
1. Filter tests to those from pandemic day 10 or earlier
2. Select the column that contains the ordering location
3. Arrange those columns by location

Data Analysis Steps

```
day_10 <- arrange(
            select(
              filter(
                covid_testing,
                pan_day <= 10
              ),
              clinic_name
            ),
            clinic_name
          )
```

The Pipe Operator %>%

Passes result on left into first argument of function on right.



```
covid_testing %>% filter(____, pan_day <= 10)
```

```
filter(covid_testing, pan_day <= 10)
covid_testing %>% filter(pan_day <= 10)
```

Data Analysis Steps

```
day_10 <- arrange(
            select(
              filter(
                covid_testing,
                pan_day <= 10
              ),
              clinic_name
            ),
            clinic_name
          )
```

Data Analysis Steps

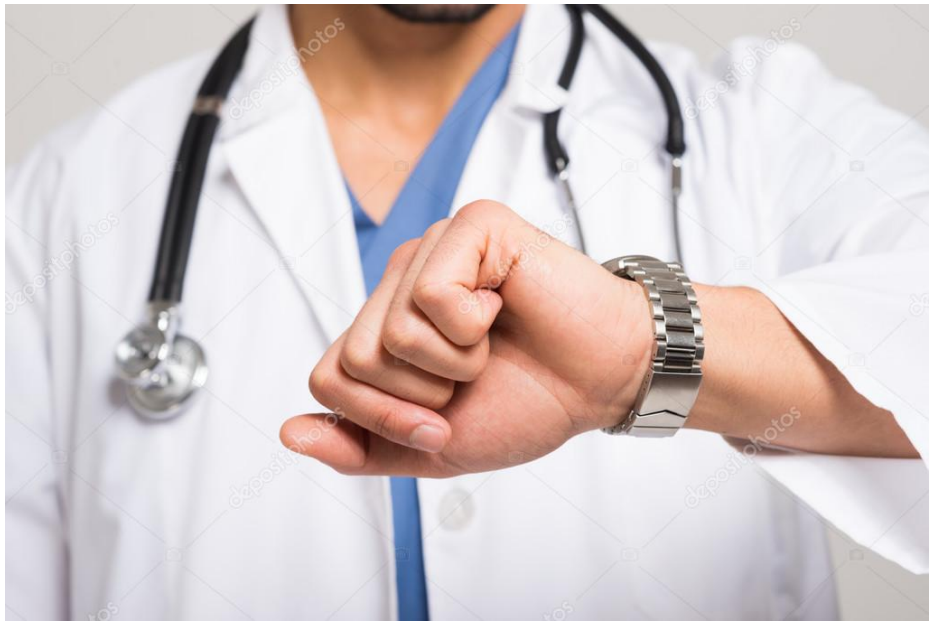
```
covid_testing %>%
    filter(pan_day <= 10) %>%
    select(clinic_name) %>%
    arrange(clinic_name)
```

Example: TAT investigation

The PICU would like a word with you because of a recent incident involving a delay in results for a patient who required an aerosol generating procedure.

They had to wait over 10 hours before the procedure could begin!

You decide to investigate…WITH DATA



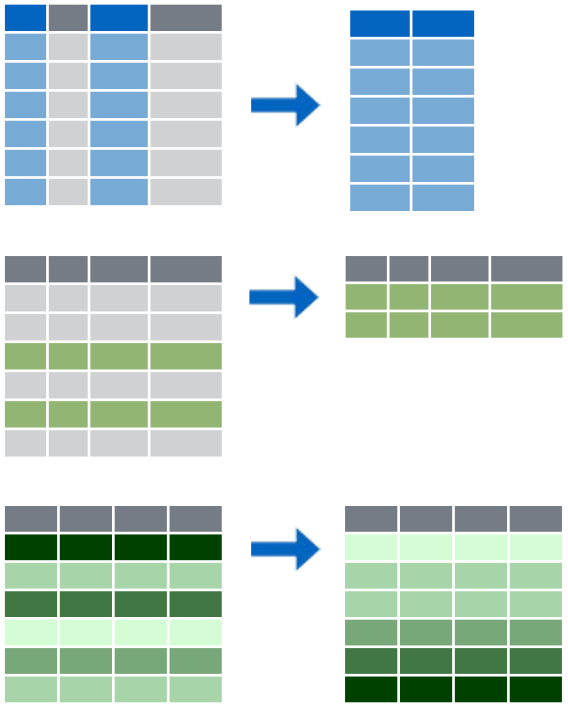
Your Turn 1

Open ‘05– Transform.Rmd’ and run the setup chunk.

Use %>% to write a sequence of three functions that:

1. Filters to orders from the clinic (**`clinic_name`**) of "picu”
2. Selects the columns with the receive to verify turnaround time (**`rec_ver_tat`**) and day from start of the pandemic (**`pan_day`**)
3. Arrange the **`pan_day`** from highest to lowest
4. Use <- to assign the result to a new variable and take a look.

Isolating data



Extract variables with **select()**

Extract rows with **filter()**

Arrange rows, with **arrange()**.

Deriving Data

What are the average and standard deviation of the total turnaround time for each ordering clinic?

Breaking down the analytical question

1. Total TAT for each order
2. Group orders by clinic
3. Calculate average and standard deviation for each clinic

Deriving data

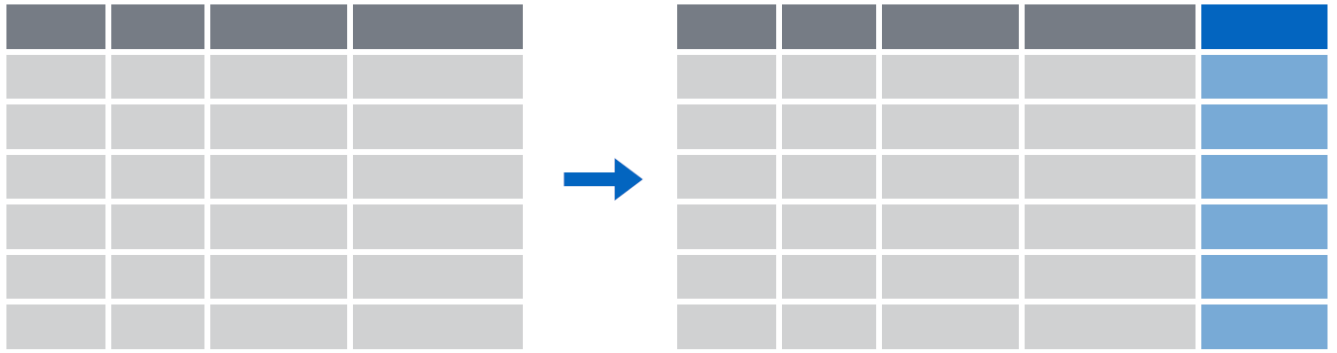
Make new variables with **mutate()**

Make summaries of data with **summarize()**

mutate()

mutate()

Creating new calculated columns



= Number of rows

↑ Number of Columns

mutate()

Creating new calculated columns

```
covid_testing %>%
    mutate(new_column = calculation)
```

name for new column

equals

function whose results will populate columns

mutate()

Creating new calculated columns

```
covid_testing %>%
    mutate(c_r_tat_mins = col_rec_tat * 60)
```

mrn	col_rec_tat	rec_ver_tat
5000876	29.5	11.5
5006017	3.6	5
5001412	1.4	5.2
5000533	2.3	5.8

mrn	col_rec_tat	rec_ver_tat	c_r_tat_mins
5000876	29.5	11.5	1770
5006017	3.6	5	216
5001412	1.4	5.2	84
5000533	2.3	5.8	138

Your Turn 2

Create a new column using the mutate() function that contains the total TAT (sum of **`col_rec_tat`** and **`rec_ver_tat`**)

mutate()

Replace columns

Function to "coerce" one date type into another data type

```
orders %>%
    mutate(mrn = as.character(mrn))
```

mrn <dbl>	first_name <chr>	last_name <chr>
5000876	sarella	stark
5006017	alester	stark
5001412	jhezane	westerling
5000533	penny	targaryen

mrn <chr>	first_name <chr>	last_name <chr>
5000876	sarella	stark
5006017	alester	stark
5001412	jhezane	westerling
5000533	penny	targaryen

Functions to use in mutate()

Vector Functions

TO USE WITH MUTATE ()

mutate() and **transmute()** apply vectorized functions to columns to create new columns. Vectorized functions take vectors as input and return vectors of the same length as output.

vectorized function

OFFSETS

dplyr::**lag()** - Offset elements by 1
dplyr::**lead()** - Offset elements by -1

CUMULATIVE AGGREGATES

dplyr::**cumall()** - Cumulative all()
dplyr::**cumany()** - Cumulative any()
cummax() - Cumulative max()
dplyr::**cummean()** - Cumulative mean()
cummin() - Cumulative min()
cumprod() - Cumulative prod()
cumsum() - Cumulative sum()

RANKINGS

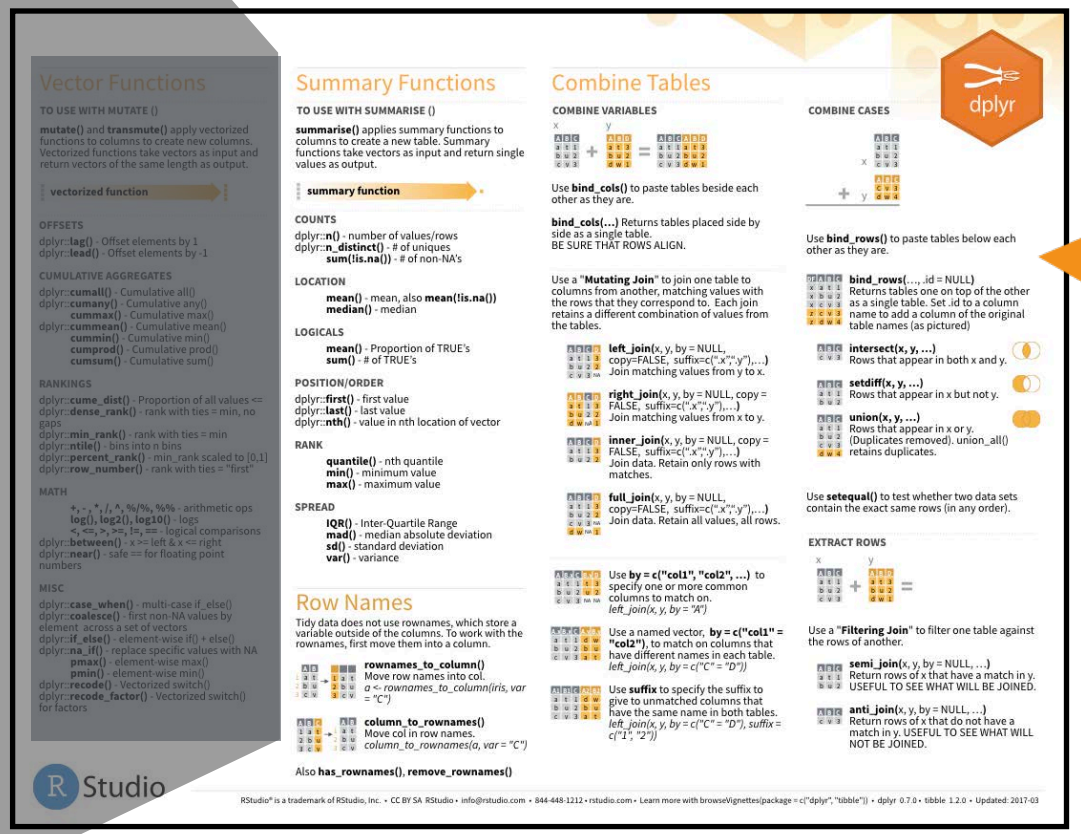
dplyr::**cume_dist()** - Proportion of all values <=
dplyr::**dense_rank()** - rank with ties = min, no gaps
dplyr::**min_rank()** - rank with ties = min
dplyr::**ntile()** - bins into n bins
dplyr::**percent_rank()** - min_rank scaled to [0,1]
dplyr::**row_number()** - rank with ties = "first"

MATH

+, - , *, /, ^, %/%, %% - arithmetic ops
log(), log2(), log10() - logs
<, <=, >, >=, !=, == - logical comparisons
dplyr::**between()** - x >= left & x <= right
dplyr::**near()** - safe == for floating point numbers

MISC

dplyr::**case_when()** - multi-case if_else()
dplyr::**coalesce()** - first non-NA values by element across a set of vectors
dplyr::**if_else()** - element-wise if() + else()
dplyr::**na_if()** - replace specific values with NA
pmax() - element-wise max()
pmin() - element-wise min()
dplyr::**recode()** - Vectorized switch()
dplyr::**recode_factor()** - Vectorized switch() for factors



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